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IN THE CIRCUIT COURT OF
THE ELEVENTH JUDICIAL CIRCUIT
IN AND FOR DADE COUNTY, FLORIDA
GENERAL JURISDICTION DIVISION

NORMA R. BROIN, et al.,
Plaintiffs,

vs. CASE NO. 91-49738
CA 22

PHILIP MORRIS COMPANIES,
INC., et al.,
Defendants.
_____/

TRIAL
VOLUME 118

TRANSCRIPT OF PROCEEDINGS in the above-styled cause before the Honorable Robert Paul Kaye, at the Dade County Courthouse, 73 West Flagler Street, Miami, Florida, on Wednesday, September 24, 1997, at 9:10 a.m.

APPEARANCES:

STANLEY M. ROSENBLATT, ESQ.
SUSAN ROSENBLATT, ESQ.
On behalf of the Plaintiffs
HUGH R. WHITING, ESQ.
JONES DAY REAVIS & POGUE
On behalf of R.J. Reynolds

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EDWARD MOSS, ESQ.
THOMASINA MOORE, ESQ.
ANDERSON MOSS SHEROUSE & PETROS
On behalf of Brown & Williamson
DAVID L. ROSS, ESQ.
GREENBERG TRAURIG HOFFMAN LIPOFF ROSEN & QUENTEL
On behalf of Lorillard
DAVID HARDY, ESQ.
WALTER COFER, ESQ.
MARTHA WARREN, ESQ.
SHOOK HARDY & BACON
On behalf of Lorillard and Philip Morris
MARIE SANTACROCE, ESQ.
KASOWITZ BENSON TORRES & FRIEDMAN
On behalf of Liggett and Brooke Groups
KELLY ANNE LUTHER, ESQ.
CLARKE, SILVERGLATE, WILLIAMS & MONTGOMERY
On behalf of Liggett and Brooke Groups
RICHARD A. SCHNEIDER, ESQ.
MICHAEL C. RUSS, ESQ.
KING & SPALDING
On behalf of Brown & Williamson and American
Tobacco Company
JOSEPH R. MOODHE, ESQ.
DEBEVOISE & PLIMPTON
On behalf of The Council for Tobacco Research
JOSE MARTINEZ, ESQ.
MARTINEZ & GUTIERREZ
On behalf of Philip Morris
JEFFREY FURR, ESQ.
WOMBLE & CARLYLE
On behalf of R.J. Reynolds
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WITNESS	DIRECT	CROSS
DR. MICHAEL W. OGDEN		
By Mr. Whiting:	14698	
By Mr. Rosenblatt:		14783

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(The following proceedings were had outside the presence of the jury:)

THE COURT: Have a seat, please. I think before we begin, let me just take up one matter. Yesterday, you all made a motion, one was to recuse and one was for a mistrial, and I took it under advisement. I think you're entitled to a decision on the recusal. The Court hereby denies the request for recusal, will defer on the motion for mistrial. Okay. Let us begin. That's nunc pro tunc, by the way.

MR. WHITING: Your Honor, I'm sorry?

THE COURT: I said the denial is nunc pro tunc from yesterday.

MR. WHITING: Let me---

THE COURT: Go ahead.

MR. WHITING: This may now be moot, but I hand the Court the original which I request be filed, and a copy. May I approach?

THE COURT: Yes.

MR. WHITING: A motion and affidavit of my client filed pursuant to Statute 38.10 in which, if I need to, I renew my request to the Court that the Court disqualify itself on the grounds that Reynolds has a well-founded fear that it cannot

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obtain a fair trial in this case based upon the prejudice and bias reflected in the comments of the Court yesterday and in prior proceedings.

Your Honor, I file this motion after careful thought and consideration and discussion with my client. I think that the events of yesterday, which the Court effectively labeled Reynolds as, and I quote, "a fox in a hen house" with respect to potential testimony about an independent study controlled and conducted by an independent expert in the face of the unequivocal and unopposed and uncontradicted testimony of that expert that the study was indeed truly and completely independent, leaves my client, together with the Court's prior refusal to accept representations of counsel, the facts with respect to the existence of documents exist, and my client's affidavit to the same effect in a prior hearing just three or four court days ago, with a concern and belief and a well-founded fear that it will not be able to obtain a fair trial in this matter. On those grounds, I ask the Court to disqualify itself pursuant to the Florida statute and to determine on the basis of papers that we filed, as you must, the legal sufficiency of our motion.

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THE COURT: Okay. Motion denied.

MR. WHITING: I ask the Court to stay the proceedings here so that we may obtain relief from the appellate court pursuant to these statutes and these proceedings.

THE COURT: Motion denied. All right. Let's proceed.

MR. FURR: We would like today to read the deposition of Dr. Spangler to the jury.

THE COURT: Spangler?

MR. FURR: Dr. Spangler. I would just like to inquire about the status of the cross-designations. We served them to the plaintiffs on Friday and we haven't gotten a response yet.

THE COURT: I have no idea.

MR. FURR: That's why I'm asking.

THE COURT: So if Spangler is going to be--Dr. Spangler---

MS. ROSENBLATT: After lunch. We've got two witnesses that will take us through most of the day and then I will be working on it during lunch and---

THE COURT: Let me know.

MS. ROSENBLATT: Okay.

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THE COURT: Who is the first witness?
MR. WHITING: Dr. Michael Ogden.
THE COURT: Ogden?
MR. WHITING: Yes.
THE COURT: Is the jury up?
THE BAILIFF: Yes.
THE COURT: Bring them out.
(The jury entered the courtroom and the following proceedings were had:)
THE COURT: Good morning, folks. Have a seat, please. How are you all doing today? Okay. Anybody watch TV, read newspapers, magazines, articles, talk to anybody, have any discussions with anybody about this case or any other allied issues? Okay. Negative answers. Let's proceed.
MR. WHITING: The defense calls Dr. Michael Ogden.
(The witness entered the courtroom.)
Thereupon:
MICHAEL OGDEN, Ph.D.
Having been first duly sworn, was examined and testified as follows:
DIRECT EXAMINATION
BY MR. WHITING:
Q. Good morning, Doctor.

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A. Good morning.
Q. Would you state your full name and business address, please.
A. Sure. Michael Wayne Ogden. I work in the research and development department of R.J. Reynolds Tobacco Company, Winston-Salem, North Carolina.
Q. Tell us where you are employed.
A. R.J. Reynolds
Q. And what is your current position at Reynolds?
A. My current job title is master scientist.
Q. And as a master scientist, do you work in a particular division with the company?
A. Yes. The title of my division is the environmental and molecular toxicology division, which is a division in the research and development department.
Q. And briefly tell us the kind of work that you're involved in, Doctor.
A. Briefly, I basically study environmental tobacco smoke measuring exposures from a chemist's perspective trying to figure out how to measure those exposures and we go out in real work places and determine what the exposures really are.
Q. Can you give us two or three examples of the

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kinds of things that you've done in your work over the past two or three years?

A. Well, in the past two or three years, we have done some studies of environmental tobacco smoke exposure in public places; we've developed those methods and published those methods on how to make the measurement of exposure.

Q. How long have you been employed at Reynolds?

A. I've been there almost 12 years.

Q. And how many of those years have you been involved in research related to environmental tobacco smoke?

A. All of them.

Q. Doctor, before I talk further with you about your background, let me just ask you, did I ask you to come here today to tell the jury about your work in analyzing and measuring environmental tobacco?

A. Yes, you did.

Q. And did I ask you to testify about the ways that environmental tobacco smoke is actually measured in the real world places?

A. Yes.

Q. Did I also ask you to tell us about the results of the studies you have done to figure out just how much environmental tobacco smoke is found

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in real world places?
A. Yes, you did.
Q. And finally, did I ask you to testify about the use of cigarette equivalents as a way of describing ETS exposures and your opinion about flight attendant exposures expressed in cigarette equivalents?
A. Yes.
Q. Let us, before we get to those subjects, Doctor, talk a little about your education and background.
Would you just tell the jury, if you will, what your educational background is, starting with college.
A. In college I studied for two degrees. I have a Bachelor of Science degree in chemistry and I also have a Bachelor of Science degree in applied mathematics.
Q. And do you have a degree beyond that?
A. I do. I went to graduate school where I received a Ph.D. or a doctorate in analytical chemistry from Virginia Tech.
Q. I think Dr. Jenkins told us yesterday that an analytical chemist looks at a mixture of things and tries to figure out what's in it and how much of

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it is there. Do you agree? Is that a fair description of analytical chemistry?

A. Yes. That's a fair description.

Q. Doctor, tell us, have you specialized in a particular area in the analytical chemistry field?

A. I have. The specialty in analytical chemistry that I studied and which I still practice is a field called chromatography which is a field of separation science or how to separate complex mixture.

Q. Help me understand what you mean. Can you give me an example of what you mean by chromatography and separation science?

A. Okay. As an analytical chemist, what we have to do with a complex mixture is separate it up into the individual components. One example might be, for example, vitamin C in orange juice. Vitamin C is in orange juice, but so are dozens of actually hundreds, if not thousands, of other chemicals. So if I want to measure vitamin C in orange juice, I have to separate out vitamin C from everything else so that the laboratory instrumentation looks only at vitamin C.

Q. Now, you got your Ph.D. in 1985, as I understand it. Were you involved in teaching while

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you were working on your Ph.D.?

A. Yes. I taught a number of university courses to the undergraduate students and graduate students, but I also participate quite heavily in training courses in chromatography to a lot of companies and other agencies. For example, we did several training courses for FBI chemists, chemists that would be involved with ink analysis, drug analysis, arson analysis, things of that nature; short courses for the American Chemical Society; we also did training programs for FDA chemists or Food and Drug Administration chemists.

Q. Now, as I understand it, you're currently designated as a visiting professor at Virginia Tech University. Tell us how that came about.

A. Over the years, R.J. Reynolds has sponsored post-doctoral fellowship programs, which is a way that we can participate with universities to help fund basic research and various basic sciences. About a little over two years ago now we established this program with Virginia Tech in analytical chemistry, and it's a program of which R.J. Reynolds donates all of the money to the university. The university then evaluates our laboratory and says yes, we want to enter into an agreement with R.J.

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Reynolds' lab, in this case, and we hire post-doctoral fellows, which means people that have just come out of school with the Ph.D.

Q. And you're involved in that program. Are you actually sponsoring a post-doctorate person at Reynolds now?

A. I am. We funded three positions. One is in the university at Virginia Tech. There are two in R.J. Reynolds R&D. One is in my laboratory.

Q. And what is your personal involvement, if any, in this whole process? Why are you a visiting professor?

A. The word that we would use is I would be the mentor of that program; that is, this post-doctoral student would be working directly with me and we would develop our research program and, of course, cooperate with Virginia Tech in what that research program would be, and we will work together over the next two years to do hopefully some fun science and publish that.

Q. Doctor, now, in additional to your work in this post-doctoral program with Virginia Tech, since you've been working at R.J. Reynolds, have you taught any courses or conducted any workshops on ETS-related issues?

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A. I have. Let's see. Over the last few years, I think it was 1993, I was invited to give a seminar at an ASHRAE conference. ASHRAE is the American Society of Heating, Refrigerating and Air Conditioning Engineers. They are basically engineers that are concerned with how air moves in indoor spaces; indoor air quality issues from an engineering perspective.

They invited me to come in and explain to them what environmental tobacco smoke was and how to measure it.

Q. And have you also participated in any international conferences?

A. I have. Two years ago I was invited to Poland to a conference, a world conference, on protection of the environment with a similar objective, that is, to explain to them what ETS is, and again, how to measure it.

Q. Let's move on and talk a little bit about your employment history, Dr. Ogden. As I understand it, your first job, after getting your Ph.D. in analytical chemistry, was to work for Reynolds; is that right?

A. That's correct.

Q. And you've been employed at Reynolds since

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that time consistently?
A. That's right.
Q. Now, can you tell us about your training in analytical chemistry? How do you use that education and training in the work that you're doing on environmental tobacco smoke at Reynolds?
A. Well, as I indicated, my training was in this field of chromatography, which is really one of the tools that a chemist will use to investigate complex mixtures. The orange juice was one example. We could also go out here and look for things in the sea water, but can we apply that to any complex mix, whether it be foods--in my case, in my work at Reynolds, the complex mixture has been indoor air, and these are the techniques and the tools that I learned as a student that now I've applied professionally for 12 years with the complex mixture now being indoor air.
Q. Would you just briefly for the jury trace your career, the positions that you've held at Reynolds since you joined the company in 1985 up to your title as master scientist today?
A. Okay. In 1985, I was hired with the job title of research and development chemist, which would be the entry level position for people just

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out of school with a Ph.D.

About three years later, I received the first promotion to what was called senior research and development chemist. A few years later that progressed to what became what was called senior staff research and development chemist, and then in 1993 I was promoted to the position that I currently hold which is master scientist in research and development.

Q. I think you told us that all of that work has been involved with environmental tobacco smoke research. Can you just give us an idea of how your duties and responsibilities have changed as you've progressed through those positions up to master scientist today?

A. Okay. At the entry level position, basically I was a chemist working in the laboratory; that I was actually, you know, mixing solutions in beakers and things like this in the lab performing the analysis, what we could call hands-on analysis.

With each promotion came increasing responsibilities, that is, younger chemists started reporting to me, so I began having supervisory responsibilities, and also with each promotion came increasing decision-making power as to the type of

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research that needed to be done; that is, as I became more familiar with the literature and things that had gone on, then I had a larger role in determining the direction of research.

Q. Well, let's talk about that for just a moment. How do you decide as a scientist at Reynolds which projects you're going to undertake? What are the criteria that you take into account?

A. Well, I think they would be the same as in any scientific endeavor. Science doesn't work in a vacuum. You have to appreciate what's gone on before and you have to appreciate, you know, the questions that are asked, but also you have to keep in mind what are the tools that you currently have. You can ask a lot of questions, but you may not have scientific tools that can answer all of those questions. So you have to look at, okay, what are the most important questions that we can answer with the tools that we have at hand. And so we apply the tools that we have to new questions and also we develop new tools to answer more difficult questions.

Q. How would you describe the process of scientific development in terms of pace?

A. Pace. I would say slow. I don't know if I

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would say snail's pace, but it would be slow. Science moves in very small steps. That is, we often say that the best experiment asks more questions than it answers because you learn something; you often are able to answer the question you asked, but many times there are things that you learn that you say, gee, wouldn't it be nice to know "what if," and many of those things then go into making up the next experiment. But it moves very slowly, very incrementally through science.

Q. Let me talk to you a little bit, Dr. Ogden, about some of the publications that you've had, and in looking at your resume, I noted that you published a number of articles in a journal, if I'm going to say this right, Journal of High Resolution Chromatography. Is that a peer-reviewed journal?

A. Yes, it is.

Q. How many peer-reviewed publications do you have about over the course of your career?

A. About 50.

Q. And have you ever served as a peer reviewer for scientific journals?

A. Yes.

Q. Can you tell us a few of those that you've actually served as a peer reviewer for?

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A. The leading journal in analytical chemistry is a journal called Analytical Chemistry. I have served as a reviewer for that journal.

There's a journal called Journal of Chromatic Graphic Science. There's another journal of Aerosol Research and Technology. Those are three that come to mind that I've reviewed manuscripts and papers for.

Q. Without trying to review all 50 of your publications, let me just try to highlight and ask you about a few of them.

First of all, you published, and again, I'm going to hope I get these titles pronounced properly, something entitled The Use of Capillary Chromatography in the Analysis of Environmental Tobacco Smoke.

Would you just briefly describe the circumstances in which you did that publication and what it's about?

A. Okay. Capillary chromatography is one of the subspecialties of this thing called chromatography that I talked to you about. This actually resulted from an invitation. Actually, it's the first time I came to Miami Beach. There was a conference in Miami Beach in the late 1980s.

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They invited me to come and give--as part of this symposium on how this technique called capillary chromatography was used in a variety of environmental applications.

My particular environmental application was the indoor air field and I describe how it could be used in environmental tobacco smoke analysis.

So that was actually an invited presentation, and then all of those presentations were put together and it's actually a chapter in a book now.

Q. So that's not published in a journal. Would that have been peer-reviewed in any way?

A. Certainly. The editors of the book would have reviewed all the papers.

Q. Let me ask you about a publication you've had entitled Gas Chromatographic Determination of Nicotine in Environmental Tobacco Smoke: A Collaborative Study.

Can you describe that for us, what's involved with that publication, please?

A. Sure. That's the first complete description in the technical literature of how we go about measuring nicotine in ETS. In fact, that is an official method and it has that designation in that

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journal.

Q. You've also published an article entitled, "Environmental Tobacco Smoke Exposure of Smokers Relative to Nonsmokers." What was involved in that one?

A. Okay. That was actually a piece of another study that we did in the early 1990s. As part of that study, we actually measured smokers' exposure to their own ETS, which, if you think about it, that sounds kind of silly, but as you look at it from a scientific perspective you realize that smokers should be exposed to more ETS than nonsmokers, but nobody ever measured that. So part of that study was to determine, in fact, just how much more ETS exposure smokers got compared to nonsmokers.

Q. Next you published an article. This has a long-winded title, Doctor: "Determination of Volatile Organic Compounds in Respirable Suspended Particulate Matter in New Jersey and Pennsylvania Homes and Work Places."

Can you bring that down to something I can understand and help both me and the jury understand what that article is about?

A. Okay. The way we talk about it in the lab, we abbreviate all that. We call it have VOCs and

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RSPs. But the nature of that study was to go out and actually measure people's exposure to these VOCs or volatile organic compounds; that is, these will be things in the air that you can't see. Like benzine, for example, would be a VOC.

And we also measured the RSP, the particles. That would be some things that we possibly could see in indoor air.

And we measured those in people as they went about their normal, daily activities, that is, as they went to work, as they went shopping, as they spent the evening at home.

And basically we compared those exposures of what people would be exposed to in terms of ETS in the work place if they worked with smokers versus at home if they lived with smokers.

Q. And this article, then, is the results of those measurements in your study of that?

A. It is, yes.

Q. You've also published an article entitled, "Environmental Tobacco Smoke: A Market Cigarette Study." What was involved with that, Doctor?

A. Okay. That was a very large piece of scientific research. The purpose of that study was to actually measure the environmental tobacco smoke

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that came from the 50 leading brand styles of cigarettes that are sold in the U.S.

So in that paper we have the 50 cigarettes. Also, it's the most complete description of the chemistry of ETS ever in one place. We measured more than 50 things, everything basically that we knew how to measure for those 50 cigarette brands, and that is in that paper.

Q. Would you tell us, was there some reason or some particular hypothesis or thesis, or whatever the right scientific word is, that you were addressing in that study?

A. Sure. The hypothesis would be the right word. The hypothesis that we were addressing was really the allegation that as mainstream smoke had lowered, had become lower over the years, that for some reason that might have actually made ETS worse.

Q. Let me stop you for a second. You say mainstream smoke became lower. Lower in what sense do you mean?

A. Well, there's technologies over the last 40 years or so in which mainstream tar and nicotine, for example, have become lower over the years, processing technologies that manufacturers like Reynolds have used.

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There were two publications in the scientific literature that had made some measurements on a thing called sidestream smoke, which is not ETS, but they had measured some sidestream smoke, and they had actually predicted that as mainstream tar went down, the stuff in the sidestream went up.

And we looked at that and said, "Well, if we really want to understand that, we need to measure it in true ETS."

So one of the purposes of that study was to generate ETS, true ETS, by people smoking, not a machine, and we did that for the 50 leading brand styles, and actually found out that no, that's not true; that as mainstream tar goes down, in general ETS chemistry or ETS chemicals come down also. So it's gotten lower over the years.

Q. Let me ask you about one other article, Doctor. You've published an article called "The Use of Cigarette Equivalents to Assess Environmental Tobacco Exposure." Can you describe that for the jury, please?

A. Sure. Cigarette equivalents is a concept that has been used for more than 25 years to describe environmental tobacco smoke exposure.

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The purpose of--two purposes, really, of that paper, one of which was to review all of that literature over the last 25 years and put together in one place a literature review of how people had used it over the years, and also to report some original research that would actually allow people to use the cigarette equivalent concept better, and that's what is the subject of that paper.

Q. I noted from looking at your resume, Dr. Ogden, that you received a patent for an air sampling system; is that right?

A. That's correct.

Q. Tell us about that, please.

A. Okay. One of the studies you asked me about, the one with the long title, the VOCs and RSP in Pennsylvania work places, as I told you, as science moves forward incrementally, when we got to the point where we wanted to do that type of study, we realized that the sampling equipment wasn't available, so we developed some sampling equipment for that.

And we did the study that you asked me about. We learned a lot from that study, and the result of that, we recognized that we think we've learned enough to be able to move another step and

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do that better. So we developed a new sampling system after that study that's then gone on and been used in other studies, and we were so excited about that new sampling system that we said we want to patent this, we want to make it available to anybody who might want to study ETS. So we patented that system and it's now commercially available.

Q. Let me ask you, are you a member, Doctor, of any professional organizations?

A. I am.

Q. Which ones?

A. I'm a member of the American Chemical Society. I'm a member of AOAC, which stands for the Association of Official Analytical Chemists. And I'm a member of ASTM, which stands for American Society for Testing and Materials.

Q. Do you work with any international organizations?

A. I do. I work with what's called ISO, I-S-O, which is the International Organization for Standardization.

Q. Would you just briefly tell us, AOAC, the Association of Official Analytical Chemists, what is that?

A. That is an organization in the U.S. that is

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primarily focused on developing and validating what are called standardized methods or validated methods of analysis.

Q. And ASTM, the American Society for Testing and Materials, what is that?

A. Similar. ASTM is larger in many respects. They have a number of committees that develop standardized test methods. Not all of them would be chemical test methods, but certainly they have several committees that focus on chemical test methods.

Q. Explain to us what you mean by a chemical method or test method. What are we talking about?

A. Okay. This would be--well, a method would simply--you can think of it as a recipe. I mean, a recipe for baking bread would be a method for taking raw ingredients and turning it into bread.

A method for chemical analysis would be analogous to a recipe where you actually have all the steps. You know, you do step No. 1, you do step No. 2, and it would allow you then to make that final analysis.

For instance, if it were nicotine in air, you have all the steps you would follow, and you have to describe those in scientific detail so that

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no mistakes are made.

Q. Doctor, when I think of measuring things, I think of yard sticks and bathroom scales. Is that what we're talking about or is it something else?

A. It's something else. Yard sticks and bathroom scales would be a scientific measurement. One measures length, one measures weight.

But the types of analyses that I'm talking about are using these pieces of equipment that you wouldn't find in the home. These would be things called gas chromatographs and liquid chromatographs and mass spectrometers and things like that, but basically it is making a measurement but it's not exactly in those same terms.

Q. We know scientists have fancy equipment. Why is it necessary, in light of the fact that you have that equipment, to develop or publish a particular method with respect to any kind of chemical analysis?

A. Well, the reason why you would want to go and pursue what are called official methods or validated methods is to make sure that--to give scientists the opportunity to use that as what we call the gold standard. That is, they could go to an official or validated method, and a scientist who

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would was, say, new to the area of measuring nicotine, for example, could go to an official method, follow the recipe and be sure they got the right answer for nicotine and ETS, as one example.

Q. What do you mean the right answer?

A. Okay. The scientifically correct answer; that is, there is a true amount of nicotine in ETS where smoking occurs. What you want to do as a scientist is go in and measure that and make sure that your answer is the right answer; that is, that it accurately reflects how much nicotine is there or particles or whatever it might be.

Q. Are there, Doctor, within AOAC and ASTM, committees that are responsible for developing methods related to ETS?

A. Yes, there are.

Q. And are you involved in those committees?

A. I am.

Q. Would you describe for the jury your involvement with respect to those two committees?

A. Within AOAC or the Association of Official Analytical Chemists, I'm actually in charge of that committee. The title that I carry there is associate referee for environmental tobacco smoke analysis. And that is a committee that is

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responsible for developing ETS methods.

Within ASTM there's a larger committee that is responsible for all of indoor air, and I'm a member of that committee and have been the project leader for developing several official methods for ETS analysis within that indoor air committee of ASTM.

Q. Now, have you and your colleagues developed an analytic method that's been approved by either AOAC or ASTM?

A. Yes, we have.

Q. You mentioned participation in ISO, I-S-O?

A. Uh-huh.

Q. Would you describe that activity for us, please?

A. Okay. Within ISO, I actually have two roles. One is as a project leader for developing methods of analysis for three ETS markers, but I also represent the United States within ISO as secretary to a technical advisory group within ISO. I'm sorry. I said secretary. It's not true. Treasurer.

Q. Has ISO approved any analytic method which you have developed with your colleagues at Reynolds?

A. Yes.

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Q. Tell me about that. What method?
A. Within ISO?
Q. Yes.
A. The method for measuring nicotine in ETS is the international standard method within ISO.
Q. Is that method also approved by AOAC and ASTM?
A. Yes, it is.
Q. Let's talk a little bit about the work that you've been involved with in researching ETS, Doctor, but before I do that, let me ask you a few preliminary questions.
First of all, as part of your duties and responsibilities at Reynolds over the past 12 years, have you become generally aware of the full range of ETS research that's been done by the company?
A. I have, yes.
Q. And have you also learned about ETS-related research that was done prior to your coming with the company?
A. Yes.
Q. Why would you find it necessary to do that?
A. Well, back to the comment I made earlier about science moving incrementally, and you asked me how I would go about determining what experiments

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you would do.

One thing you have to keep your eye toward is what has gone on before you, for two reasons. One, people discovered things that you would like to know about and you would like to use. But also, people have made mistakes in science and you want to make sure you don't make those same mistakes.

So you don't want to re-invent the wheel and you don't want the mistakes in science to be repeated, so you have to keep an eye to the past, and also keep an eye to the present so that you can apply new techniques, emerging techniques in science.

Q. As part of your duties and responsibilities, are you also expected to be aware of ETS-related research by others including research by your domestic competitors?

A. Sure.

Q. Again, why would that be?

A. Again, that's sort of the present. You want to be aware of how other people are thinking about modern day issues or current problems, so it's very important in shaping the scope or the nature of research that you do.

Q. Doctor, how long has the company Reynolds

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that you work for been involved in ETS-related research?

A. About 20 years.

Q. As you understand it, why did the company begin working on ETS-related issues?

A. Number of reasons. First and foremost, I would say it's important to our customers. There were social concerns about smoking in public or in public places. Our customers, you know, portrayed that to us. We recognize that. We share that concern and we began to investigate ETS.

Q. Would you tell us, as best you can, just as an overview, what the primary focus or areas of focus of the ETS-related research efforts have been?

A. Okay. Primary focus of our effort to understand ETS is to study what we would call markers of ETS; that is, these would be things that we could measure that we can relate to ETS. So we study markers of ETS; we develop methods; we also study environmental tobacco smoke in the laboratory, but ultimately we want to know about ETS in the real world. We want to know about it in smokers' homes; we want to know about it in restaurants, aircraft cabins.

So we have to develop methods and scientific

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methods that would allow us to study ETS in those real world settings. So our focus has been on understanding the chemistry and physics, developing markers or ways of measuring ETS, and then going out in what I would call the field or the real world and making those measurements.

A. Let me ask you this, Doctor: The tobacco industry has been manufacturing cigarettes for a long time, and my assumption is they know a lot about tobacco smoke.

Why was it necessary to conduct research to determine methods to evaluate and measure ETS?

A. Well, we do know a lot about tobacco smoke. As a company and an industry, we have studied tobacco smoke intensively over the last 40 or 50 years.

ETS is a different smoke, and primarily the difference is very low levels, that is, low concentrations. So we can guess what might be there from looking at mainstream smoke and sidestream smoke, but we also know enough about smoke to know not to guess.

If we want to know the right answer, we need to go into ETS and measure that. And because levels are generally so low, and as scientists, we have not

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had the tools to see those low levels until about the last 15 or 20 years. So it's in this time frame that we are actually able to study ETS in a real world environment.

Q. Let me take you back to about the time when you came to the company or shortly before, Doctor, and at that time would you just describe for the jury what was the first major ETS-research-related project that was ongoing?

A. Okay. The first major project that I would describe would be in about the 1983 time frame where RJR developed what we call an environmental chamber. And that really is a special room that is in the laboratory that has a lot of special controls; that is, we can control temperature, humidity, ventilation rate, for example, but we have this environmental chamber and associated laboratory.

Q. Let me stop you, Doctor, and ask you, did I ask you to bring with you some photographs today that would represent that chamber?

A. You did, yes.

Q. And do those photographs accurately depict the environmental chamber that you're describing and the equipment that's associated with it?

A. Yes, they do.

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Q. Would they help you and assist you in describing that for the jury?

A. I think they might, yes.

MR. WHITING: With the Court's permission, let me approach.

THE COURT: Show it to counsel, please.

MR. WHITING: They have a set, Your Honor.

MR. ROSENBLATT: We have a set, Judge. We got it this morning.

Q. If I may, with the Court's permission, ask you to just step down and describe for the jury the environmental chamber. I've got a blow-up of it here, Doctor, which might be helpful for the jury. Can you all see that?

Is that a picture of a chamber that you were describing?

THE COURT: I can't see it. Okay. I just wanted to know which one it is.

A. Yes. That's the chamber that was developed in the 1983/'84 time frame. That's not the best picture in the world that you can ever imagine, but, really, it's one of the best pictures we have of this chamber.

As you can see, the surface of the walls is

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made of stainless steel, and one of the things we learned, it's not a great scientific discovery, but you can't take a very good flash photograph inside a stainless steel box because of all the reflections off the walls.

But this would be actually a picture taken from the door of the chamber so you would be roughly be standing in the door.

This is some of the ventilation system where we actually can control the ventilation so we can mimic a lot of environments. We could change the temperature; change the humidity of the air, make it very dry, make it very humid; also change the ventilation rates.

There are fans in the chamber, there's one here, there's one on the opposite wall you can't see, to make sure that--remember, this is a laboratory environment so we want to make sure that the air is well mixed so we can go in there and take a sample over here and over here, and again, get the same answer.

This is actually some equipment. You can't see it very well. It's not important to see it, but this would be actually in the middle of one experiment where we are actually doing some research

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on air cleaners, that is, ways of removing things from the air. This would have been a picture taken in that experiment.

Q. About how large is this chamber?

A. In technical terms it's exactly 18 cubic meters. It may not tell you much. I would characterize either as a small room or very large closet, depending on how you want to look at it. But it would be a room probably from the end of the jury box to about right here back to the wall. It didn't have quite an eight-foot ceiling, so it had about a seven or seven and a half foot ceiling. So about this tall.

THE COURT: Can you translate that for me? From there to there.

THE WITNESS: That would be probably in the neighborhood of maybe ten feet by ten feet by seven feet.

THE COURT: Okay.

Q. Doctor, let me just put up the blow-up of the second picture, and if you can describe for us, if you will, what this reflects.

A. Okay. This is--as I described it, we had a chamber which was the previous picture. This is actually the laboratory that is connected to that

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chamber.

So this wall back here is actually the outside wall of one of those chambers. That would be like if you're in the chamber, this instrumentation would be on the wall behind you connected through the wall.

These are a number of scientific measuring devices that are used. This is actually a window into the chamber, so you could actually envision that, and then some of the technical equipment that would be used to determine how much ETS is in that chamber.

Q. Is this chamber that's reflected in the first picture that the jury saw the chamber that you use today to study environmental tobacco smoke?

A. No, it's not.

Q. Okay. And does this then, this third picture, reflect a picture of the chamber that you use today?

A. Yes. Again, same problem with trying to take a picture inside the box, but this--we used the previous chamber for about ten years. In the early 1990's--again, we learned things about that old chamber. We wanted to be able to do it better, so we actually built new chambers.

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We actually built what we call the twin chambers. This is one of those. There are twins. There are two of them. But this would be the inside of one of those chambers and it is larger than the other chamber and you can see it's got a little more pleasing appearance. It's not this stainless steel. It's sort of a painted or baked enamel finish.

Q. Doctor, have you also brought with you today to show to the jury an actual chamber developed by R.J. Reynolds to evaluate and measure sidestream smoke?

A. Yes, I have.

Q. With the Court's permission, could I ask you to get that out?

THE COURT: Okay.

THE WITNESS: Sure.

Q. If I may, Doctor, I would just like to ask you to--using the first chamber that you developed and that sidestream chamber, first describe that for the jury and then explain why you need a room as opposed to small piece of glass to evaluate ETS as opposed to sidestream smoke.

A. Okay. Sidestream smoke and ETS are--to a scientist they are very different things. This would be a room for measuring ETS; that is, a person

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would go in there, a smoker would go in there and smoke a cigarette. That's real ETS.

This is a device that we actually developed at RJR to measure sidestream smoke. There are a number of different devices in the scientific literature. This is one of them. It's called a Harris chamber. It's named after Dr. Harris, a researcher at RJR.

You want me to describe how it works?

Q. Yes, please.

A. Okay. Sure.

It's missing a couple of pieces because they are still back home connected to the laboratory, but this is, as you can see, is made out of glass. It really comes apart here. This is just a clamp that holds it together.

The cigarette would be mounted in here. There's actually a hollow tube that would extend through here and the cigarette would be connected over here.

The cigarette lighter, kind of like the lighter in your car, would go in here, and then it stays plugged. So this would actually be closed off during the operation. So we have got a cigarette inside.

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There's a small inlet tube here that the air would come into, that is, the air to go over the cigarette, and then there would be a trap or collection device up here that would collect all of the smoke.

So this is a very small chamber. A cigarette would be burned in here. Everything coming off of the lit end of that cigarette without allowing it to dilute or age would be then trapped on this pad or on one trap. It could be a filter. I think I may describe those later.

But this device, particularly, if you can imagine burning a cigarette in there, this glass gets very, very hot. In fact, it gets so hot you can't even touch it.

So you've got a very concentrated smoke right off the lit end of the cigarette. It doesn't age, it doesn't dilute, and it can do some funny things because it's in this very artificial chamber. It's in the small chamber.

Q. At the risk of the obvious, contrast the sidestream chamber with the ETS chamber and why do you use this for ETS?

A. Well, first of all, we can get a smoker that can actually go in there and smoke a cigarette.

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That's one phenomenon, although it's obvious, and it may sound silly, but it's not. In this device, as I just described it, this chamber gets very hot. And so artificial things that can go on inside this chamber.

Obviously, a smoker inside this small room smoking a cigarette, the walls aren't going to get hot. That's one difference. And the biggest difference, though, really is just the simple space, how big it is.

The smoke that is generated in that chamber can age and dilute and become true ETS. In this type of device, it never has that chance.

Q. If you would return to your seat, Doctor.

A. Sure.

Q. And let me ask you to describe for the jury if you will, Dr. Ogden, the first substantive research project that you undertook using this environmental tobacco smoke chamber that we have talked about.

A. Okay. Connected to that chamber is a device that is called a TAGA, T-A-G-A, which stands for trace atmospheric gas analyzer. This is a very specialized piece of equipment. Using that piece of equipment attached to that chamber---

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Q. Let me just stop you, if I may. Let me point so you can see. Is this a TAGA?

A. Yes. In fact, you probably can see the name on it there right below your hand. That whole thing is the TAGA. This is actually the second one of these pieces of equipment ever made in the world.

With that equipment connected to this room, Reynolds scientists were the first to actually discovery that nicotine in ETS is actually in the vapor phase, that is, it's a gas and it's not in the particle.

Prior to our research in 1984, 1985, scientists had assumed, incorrectly, that nicotine was in the particles of ETS like it is the particles of mainstream smoke and sidestream smoke, but we found that it wasn't.

Q. I want to come back to that, but first, why do you have to buy a new piece of equipment the size of the TAGA in order to make that discovery? What is it that this machine enables you to do?

A. Well, what it enabled us to do was to actually study nicotine, and what I would call real time, at the levels that it's normally encountered in ETS; that is, at the very low levels.

Prior to Reynolds' use of this particular

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device to investigate that problem, no one else in the world would do that. They could not look at nicotine and couldn't find it in real time. There was no piece of equipment sensitive enough to find nicotine at the low levels, that is, that it's found in ETS.

Q. Now, Doctor, you said that you discovered that nicotine was in the vapor phase as opposed to the particulate phase of environmental tobacco smoke. The jury has heard some testimony about the two phases. Why was this discovery important?

A. Well, a couple of reasons, really. One, and the first and foremost, is we now understand that there are--well, we always knew that there were two phases. What we want to try to do with this marker approach that I described briefly to you before is we want to find one or two or three or four things that we can measure that we can predict ETS from.

Generally, to do that, you have to have markers of both phases, the vapor phase and the particle phase, and by now knowing that nicotine was in the vapor phase, we thought we had a pretty good marker for the vapor phase, but that also let us ask the next question. Now we need to find a measure or marker for the particle phase.

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Q. Let me focus on nicotine and ask you whether or not Reynolds published the results of your research in which discovery was made that nicotine is in the vapor phase.

A. Yes, we did.

Q. And where and how was that presented or published?

A. The first scientific presentation of this discovery was made in 1985. Then in 1986 it was also presented at another conference but then published as a result of that. And also in 1986 Dr. Green from our department made a special presentation to the National Academy of Sciences telling them about this discovery.

Q. Prior to these presentations and publication, have there been any other reports in the scientific literature identifying nicotine as in the ETS vapor phase?

A. No.

Q. What was the next step? Once you made this discovery, what was the next step that you and your colleagues took in connection with your analysis of nicotine and ETS?

A. The next step was to take this new information that science had provided us and take

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the next little step forward. As you look back in the broad scope of science, the next step was to try to develop this chemical method of analysis that I was describing earlier and make it such that we could now measure nicotine in the vapor phase and measure it at the levels that it's found in ETS.

So we began an effort to try to be able to measure that nicotine with devices that were not as big and, you know, not laboratory devices like there on the bottom; something that we could actually take out in somebody's home or somebody's office and make a measurement.

Q. Did you ultimately then develop a method that could be used for the measurement of nicotine?

A. Yes, we did.

Q. And when was that developed?

A. In fact, that was the first major project that I worked on personally in joining the R&D department in '85. I would say about one year later, in the Fall of 1986, is when we had the first complete description of that method. As science moves forward, we made improvements over the years, but that was really the first complete description of our method for nicotine and ETS.

Q. Was that method approved by AOAC that we

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talked about earlier?
A. Yes, it was.
Q. Would you describe for the jury, please, the approval process that you went through to have that nicotine measurement method approved?
A. Within AOAC?
Q. Yes.
A. The AOAC approval process is fairly elaborate and complicated. It requires what is called in the scientific community a collaborative study; that is, a certain number of laboratories must get together and study that method and make sure that they get the same answer.

So within AOAC, the process was, very briefly, you have to develop the method which we had developed. We submitted it to AOAC for their board to look at and for their scientists and statisticians to say yes, on paper that looks like a good enough method to go to the next step.

The next step would be this thing called a collaborative study where six laboratories from around the world were sent copies of this method. They implemented it in their laboratory. They were sent samples. They made those measurements. Statistical analysis was done. And then all those

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data were sent to AOAC for their statistical analysis, and basically, everybody came to the same conclusion: Yes, this method gives the right answer. And if these six laboratories all get the right answer, then the stamp of approval, yes, this is a validated method.

Q. Has that method also been approved by ASTM?

A. It has, yes.

Q. Have any other methods for measuring nicotine in ETS been approved by either AOAC or ASTM?

A. No, they haven't.

Q. Now, at the time that you developed this method for measuring nicotine in ETS, was there any other scientific method in the literature for measuring nicotine in the air?

A. Yes, there was.

Q. Why did you need to develop a new method for ETS?

A. Well, there was a method, still is that method. It's called a NIOSH method, N-I-O-S-H. But it really was designed to measure nicotine that might be encountered in a manufacturing process, that is, in tobacco barns and tobacco manufacturers, in processes, where nicotine may evaporate from the

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tobacco. Because of that, it was set or the method was developed for very high levels. In fact, if we use that method to study ETS, we wouldn't find anything because there simply wouldn't be enough to measure by that method.

Q. Let me stop you there. I'm not sure I understand. What do you mean we wouldn't find anything there? You have a method to measure nicotine, but you wouldn't find anything?

A. Right. In science terms I would call that--we would have to look at the level or concentration of nicotine in ETS against what's called limit of the detection; that is, the ability of this method to find it.

An analogy would be back to your bathroom scales. If you think of a set of bathroom scales, if I stepped on those scales, it's obviously going to give me a pretty big number. But if you think of a housefly that would step on those bathroom scales, in your mind you know that that fly has weight, but those bathroom scales are going to read zero because the weight of the fly is below the limit of detection.

It's the same thing with this NIOSH method and ETS. It has a limit of detection of 200

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micrograms per cubic meter. And the majority of ETS levels are far below that, so we had to develop a method that was ten thousand times more sensitive than that method to be able to find nicotine in ETS.

Q. Have you and your colleagues, Dr. Ogden, developed analytical methods for other ETS constituents other than nicotine that can be measured in real world environments?

A. Yes, we have.

Q. And have some of those methods also been approved by AOAC or ASTM?

A. Yes, they have.

Q. And which ones?

A. Okay. Methods for another vaporization component is a compound chemical called 3-ethenylpyridine. It is usually best abbreviated 3EP.

We also have validated methods for the particles which are called RSP, respirable suspended particles, and other markers called UVPM and FPM which are markers of the particle phase of ETS.

Q. How about Solanesol?

A. Solanesol is actually now in the approval process within ASTM, so it is now under study by that committee and, of course, it's been published,

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but it should be approved by them within the next six months or a year.

Q. Now, given the fact that you have the several methods in the literature and approved, why pursue a new one like Solanesol? Tell us what's involved with your discovery there and why you are pursuing that method.

A. I actually described part of that earlier when I said nicotine we now know is in the vapor or gas phase. We also, to fully understand ETS, we need to develop markers of the particle phase as well so that, in fact, was my next research project, to look for a marker of the particle phase of ETS. And based on our knowledge of tobacco smoke and ETS and using, again, some new equipment that was just available or just been developed in the scientific world, we were the first to discover Solanesol in environmental tobacco smoke and then that was in 1986 and then we began developing methods that could measure that in real world environments.

So, now with nicotine and Solanesol, for example, we have two good markers of one of the vapor and one of the particle phase of smoke.

Q. Doctor, is it currently possible to measure all of the constituents of ETS?

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A. No it is not.
Q. Why not?
A. A number of reasons. One is that the first and foremost reason is because of the low concentrations. That is, it's so dilute in most environments that many of the chemicals that you might expect to be there, because of knowledge of mainstream or sidestream smoke, have never been found. Only a hundred or so chemicals have actually ever been measured in ETS. Most of those in laboratory situations. So, dilution is the primary factor, low levels.
Q. And what are the units of measurement that are typically used to describe constituents of a mixture like ETS at these levels?
A. Well, about the highest unit of measure you would ever see is something called microgram per cubic meter. There are also measures lower than that of nanograms per cubic meter or even picograms per cubic meter.
Q. Doctor, did I ask you to develop an exhibit that would help us to explain and me to understand these concentrations of units of measurement?
A. Yes.
Q. And would that exhibit help you in

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illustrating those constituents for the jury?
A. I think so, yes.
MS. ROSENBLATT: Your Honor, we need to have a side bar.
(Counsel and the court reporter approached the bench, and the following discussion was held outside the hearing of the jury:)
MS. ROSENBLATT: There are two. Are you intending to do this one as well?
MR. WHITING: I don't know.
MS. ROSENBLATT: You are not?
MR. WHITING: I said I don't know. I'm not there yet.
MS. ROSENBLATT: Our objection is that this may be final argument to talk about comparisons of pools and the Orange Bowl -- it cannot be based on any scientific basis. There's no calculations. It will all be in the record and this is -- they're trying to make a point, you know, a needle in a haystack, whatever the point may be, but to have this, it's very argumentative. And if he wants to argue this in closing argument, I don't think it is appropriate with a scientist to do this type of presentation.
THE COURT: This purports to show that

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if you dump the contents of this packet into a swimming pool, it would end up as a microgram per cubic meter measurement?

MR. WHITING: What it shows, Your Honor, and it's meant not to be admitted into evidence but to illustrate his testimony which is to put the concepts of microgram, nanogram and picogram in terms of volumes in context with for the jury.

So, it would take one package of Sweet 'N Low in 400 swimming pools --

THE COURT: Oh, 400 pools?

MR. WHITING: -- to have a microgram per cubic meter.

THE COURT: I understand now. So, we don't know --

MR. WHITING: He can be cross examined, he's -- these calculations have been done.

THE COURT: So, getting down to what's called picograms.

MR. WHITING: Picograms.

THE COURT: So, you would have 200 areas the size of Lake Okeechobee by volume for one picogram per cubic meter of whatever is in Sweet 'N.

MR. WHITING: That's all it's for. That's what it's for to illustrate that for the

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jury.

THE COURT: Overruled.

(The following proceedings were held within the hearing of the jury:)

BY MR. WHITING:

Q. With the court's permission, Doctor, if I can ask you to step down and with this illustrative exhibit, if you can describe for the jury what you have done here to demonstrate microgram and nanogram and picogram as units of measurements in a volume or in air.

A. Sure. Many ways have been used over the years both in what I call the popular press and scientific literature to try to portray what these concentrations are. This is simply one way of doing that. And the analogy that I have chosen here is to take a pack of Sweet 'N Low, which has about one gram of Sweet 'N Low inside of it. One gram would be one million micrograms. So that is there are one million micrograms of Sweet 'N Low in that package.

To get to the unit of concentration of one microgram per cubic meter, you would have to dissolve that gram package in 400 Olympic-size swimming pools, and for this particular analogy, we have used the University of Miami swimming pool

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which holds 650,000 gallons of water.

Q. Let me understand a cubic meter. If what we're talking about is a microgram per cubic meter, we're talking about one microgram, one millionth of a gram in a box of air that would measure about a yard by a yard by a yard?

A. Right. This is a little short for a meter, but if you could think of a cube, that would be this long, this wide and this high, that would be approximately a cubic meter. And you would need a million of these boxes and you would have one microgram in each box, and that would be one microgram per cubic meter.

Q. I take it the principles are the same, but if you would go through nanogram and picogram for us, please.

A. Exactly. A nanogram is one billionth of a gram, so there are actually one billion nanograms of Sweet 'N Low in that package you buy. To get that same concentration, this analogy is using the Orange Bowl, which the way I'm using it here is assume you put a lid on top of it and fill it with water. Little bit of a strange experiment, but it would take a thousand Orange Bowls filled with water and dissolve that one pack of Sweet 'N Low, the

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concentration, again, we're talking now we would need a billion of these boxes, and that would be one nanogram in each of the box.

Q. And picogram?

A. Same general idea. Picogram now is one trillionth of a gram, so there are a trillion picograms of Sweet 'N Low in that pack. The volume that we would need, the volume to measure now in terms of cubic meters, you would need 200 Lake Okeechobees to do that, to get the volume necessary to give you that concentration.

Q. Thank you, Doctor. If you would just return to the witness stand. Let me ask you, Doctor, are you currently trying to develop measurement methods for other constituents of ETS?

A. Yes, we are.

Q. And would you describe that for me?

A. Again, in the general theme of science moving forward based on knowledge we have gained, advances in instrumentation and equipment, we have had a project going on for a couple of years now trying to measure nitrosamines in ETS?

Q. To date, Doctor, has anyone developed a method for measuring nitrosamines in ETS in real world environments?

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A. No.

Q. Now, can you use methods developed by scientists for sidestream chambers or exaggerated kinds of concentrations to measure nitrosamines or to evaluate nitrosamines in real world ETS environments?

A. No. Those methods would be back to the fly analogy on the bathroom scale. We would get zeroes if you apply those methods.

Q. Well, why is it that we're in 1995 or 1997 and just beginning to understand or try to develop methods to measure something like nitrosamines in tobacco smoke -- excuse me, in environmental tobacco smoke?

A. Again, I draw you back to maybe an answer I gave you earlier. And with science moving forward, I painted a picture, hopefully, for you of where we ask questions and then say, well, do we have a chance of answering that question.

This nitrosamines in ETS is not a new question, but now it's at this point in time over the last couple years that we think we know enough, we have enough sophisticated equipment that we now may have a chance of being able to do it.

So, it's not a new question. It's just now

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that we think we're first able to maybe provide an answer.

Q. Can you, Doctor, using your example of the difference between the pre-existing NIOSH method for measuring nicotine in the air to your ETS method for nicotine in the air, you said it was 10,000 times more sensitive than NIOSH, how far do you have to go to be able to measure nitrosamines in environmental tobacco smoke?

A. That's a good question. We don't really know because we don't know how much nitrosamines are in ETS but we can make a scientific estimation that we probably are in the same order of 10,000-fold reductions.

Q. Additional ten --

A. Additionally 10,000.

Q. Let me just move from talking about methods and units of measurement and ask you whether or not you and your colleagues have also developed equipment to do these measurements in real world environments?

A. Yes, we have.

Q. And why was it necessary to develop equipment, again, when it seems obvious you are a scientist, you ought to have this stuff.

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A. Well, that's one way of looking at it. Another way of looking at scientists is also to develop that equipment. That equipment didn't come out of the Sears and Roebuck catalog. I mean, the scientists had to develop that.

So, as I explained to you our approach for certainly the last more than 10 years, almost 15 years, is to develop the chemical methods of analysis but also the equipment or the tools that would allow us to employ that in real world environments. It didn't exist. Somebody had to go in and do it, and sometimes that means inventing brand new things. Sometimes that just means minor improvements to things that already exist, but improvements are necessary to be able to make the measurements.

Q. Dr. Ogden, have I asked you to bring to the courtroom with you some examples of the kinds of things you have used in actually doing measurements of ETS in real world environments?

A. Yes, you have.

Q. And would using those help you to explain those concepts to the jury?

A. Yes.

Q. With the court's permission, I'd ask you to

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step down and just take the basic equipment that you brought and describe for the jury conceptually how you would measure RSP and nicotine in an indoor air environment.

A. Okay. This will take me just a few seconds to unpack my box.

MR. WHITING: Your Honor, I don't know if we need -- does anybody need a break?

THE COURT: Not that I know of.

Did I hear a noise?

MR. MOSS: Yes, I hope.

THE COURT: Does anybody on the jury want a break?

No. It's a consensus.

THE WITNESS: The first thing that I'll show you is actually an air sampling pump that is actually used to move the air, to collect the air to sample it. You could think of it maybe like an aquarium pump or a vacuum cleaner working in reverse. Actually, the vacuum cleaner working in normal modes.

I'll turn it on and show you the pump and show you how we collect particles. All this pump does is simply suck air. It sucks it through this tube here and blows it out through this tube here.

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It's a little more sophisticated than an aquarium pump. It has some little miniature computer type controls. It has a clock built into it. After it samples for a minute, it will click up a one here.

But you can also see on the side here is a fairly crude but anyway it's a device for measuring the air flow rate. That is, we need to know how much air this thing is pulling. In the example I gave you earlier, cubic meters would be one volume. You can also think of volume in liters or gallons. This one is calibrated in liters per minute.

So, right now that little ball sitting at about three, it's pulling in three liters of air per minute.

Q. Let me make sure I understand. We talked before about cubic meters and maybe you just explained that but I missed it. Liters versus cubic meters, what are we talking about?

A. There are 1,000 liters in a cubic meter. So, this one at three liters per minute would be .003 cubic meters per minute.

You asked me to do particles first and I'll do that. We buy special filters that we actually use to collect the particles. They come in a box like this. And in the laboratory we use forceps or

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special tweezers to pull them out so we don't contaminate it with our fingers. But for demonstration, I won't try to do that if you will allow me just to grab it and pull it out.

Q. Why is it necessary not to contaminate them with your fingers, Doctor?

A. Well, one of the most sensitive methods that we use is actually trying to weigh the amount of particles that we can collect on a filter, and we have to weigh down to microgram levels. Microgram now, a millionth of a gram, we actually have a piece of laboratory equipment that can weigh one microgram.

If I were to touch this filter with my finger, my fingerprint weighs 10 or 50 or 100 micrograms, so it would interfere with the analysis. So, you can't touch it with anything that would -- you have to protect it from dust and you simply can't touch it.

I'm taking a shortcut here, but I'll pass this one around. This is a filter that we use. Actually to collect the particles, we put it inside a holder. This one is made of clear plastic, so this filter is laying on the inside of this.

This particular filter that we really

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developed for this ETS measurement is made of a special very thin film of Teflon. It actually has holes in it. You can't really see the holes. You can see what looked like bigger holes but these are really just dimples. The holes in this filter are one micron, so if you even hold it up to the light, you won't be able to see through it.

I'll just pass that one around.

Q. Let me ask you this, Doctor, while the members of jury are looking at that filter. As a matter of concept, is this any different than my filter on my heater at home?

A. As a concept, no. You have a filter on your furnace or filter on your heat pump or whatever you might have, same idea. You are bringing air through and you are hoping it's going to stop the particles. This filter is much more efficient, but it's the same idea. It's like what I do when I get around to changing the filter on my furnace, I can see dust on it.

If you collect enough particles on that filter, you will actually be able to see it. But generally you can't. But the sensitive instrumentation in the laboratory can see it or can weigh it, but you can't with your eyes.

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Q. Why don't you go ahead and describe how you would use the pump with that filter?

A. As I said, the filter, I have one filter loaded inside this plastic holder, and we could connect it there, switch it back on, and now we're actually sucking air through that filter.

I would not rely on this measurement as a scientist. This is just an indication -- I would actually use another piece of equipment to very carefully measure exactly what the air flow is coming into this filter. But now this is pulling the air from the room through this filter. I think as a physical process, that's the easiest one to understand.

Any particles that are in the air that enter this filter are going to get filtered out. They're going to get stuck on the filter. The air is simply pulled by the pump and pushed back into the room.

Q. Let me ask you this: There's no smoking in this courtroom, but if we left that pump on just in the configuration that you have it now for a period of time and you took it back to your laboratory, assuming you hadn't contaminated it with your fingers, would you be able to detect RSP on it?

A. Yes, we would. I didn't touch this one with

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my fingers. This one was assembled in my laboratory. But yes, very clearly, we would be able to measure particles in this air without question.

Q. Why don't you then just briefly describe the difference between that system and the way you would measure nicotine?

A. I'll pass this one around too. Don't worry about contaminating. We're not going to make that measurement.

I brought some extras of these. I'll pass one around. We can use the same type of pump. All we need is a pump that can maintain a carefully controlled flow rate, but now what we have to do is to use a trap that's actually going to stop the nicotine molecules as they come through on this one, and I brought some of these around. Don't break them open or anything, but these are actually flame sealed. They're not sharp as they are, but I have a couple of these so we can start one at each end.

This is actually called -- the technical terms are an XAD absorbent tube. The XAD is the little white granules on the inside of it. This we worked with a company to specially develop for making nicotine measurements. There were some similar types of tubes commercially available in

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1984 and 1985. We evaluated those. They didn't work so well, so we worked with the manufacturer to say how can we make them better.

For sampling, you would do what I have done here, and in science you have a tool for everything, so we have a special little tool that clips the ends of those to open up the tube. That's what I have got here. I won't pass this one around because it does have a little bit of a sharp edge on it.

But basically all we do is connect this to the pump, turn it back on, you can hear the pump a little bit louder maybe. It's working harder to draw air because there's more of a restriction with these particles.

But now, same idea, air is coming through here, but because of the nature of the interaction of nicotine with these little white beads inside, any nicotine molecules that might be in this air would be trapped as we're sucking the air through this particular tube.

Q. How do we know that that little thing is going to trap all the nicotine that might be in the air?

A. Well, you don't know by looking at it, but you have to develop a method. That's part of the

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method, development and validation process. There are numerous experiments that we have conducted in the laboratory to prove that there's no measurable nicotine coming through this particular tube here.

Q. Last step, Doctor, will you just briefly explain to the jury what you do once you have a measurement of an ETS in the real world environment, what do you do when you take it back to the laboratory to figure out how much nicotine or how much RSP are on those filters?

A. First thing we do -- I forgot to do it on the filter. We have some little plugs that we would obviously cap those off to make sure it doesn't get contaminated. Same general idea with this tube. Once we're finished collecting the sample, we put caps it on to make sure of two things. One, in this case, that no nicotine that's in here gets out and no nicotine on the outside can get in so it doesn't get contaminated.

So, this would be the way that this particular sample would get sent back to the laboratory. Same with the filter you have would be capped. Generally, we would send them frozen with dry ice.

But what we would then do in the laboratory

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with that filter that came around earlier, we would weigh it again. That is, we weighed it before we took a sample with a special balance like your bathroom scale but a little more sophisticated. We would weigh it again and find out how much weight it picked up, if any.

We would then take that filter and we would push it down in a little vial here like this, and we would add what we call a solvent. In this case, it is methyl alcohol, because we know -- we have shown scientifically that methyl alcohol dissolves the particles that are on this filter and we shake it up.

I don't sit there and do that. Again, we have a piece of equipment that actually does that. It's called a wrist action shaker, so that's what would be done.

Now what we could do is we could go to the chromatography or chromatographic analysis, and that would really be a piece of equipment that would take a very small sample of this liquid and would actually analyze that. One of the markers that we described, UVPM, would be done by analysis like chromatographic analysis of the liquid in this.

I'll pass that one around.

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Q. Let me just ask you, Doctor, is the concept similar with respect to nicotine? Same idea? You take the material out of your tube, put it in the solvent?

A. Exactly the same, and that's what I have done here. It's a different solvent, little different vial. We push all of the little granules, little white XAD beads, everything in that tube, we push it down in the vial and now we extract it in a solvent and we use in this case what's called a gas chromatograph and take a small sample of this and in the laboratory we can find out how much nicotine, if any, is in this vial.

Q. Let me ask you to return to your seat and I'll ask, if I can, our bailiff to relieve the jurors of their samples.

While they're looking at that, Doctor, let me just ask you one question. Are there more than one kind of device monitor that have been used to measure ETS in real world environments?

A. Yes, there are.

Q. And would one be called an area monitor and one a personal monitor?

A. That would be two types of monitors that would generally be described, yes.

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Q. Let me ask you this: Would you just briefly describe for the jury, if you will, the company's first involvement using an area monitor or evaluating an area monitor?

A. Okay. The pictures we showed earlier, I think you saw a lot of the pieces of equipment, these big pieces of instrumentation that were in the laboratory. Our first effort was to use that equipment because we had shown in the laboratory that it worked, but it's -- as you could see, some of those pieces were fairly big.

So, really the first experiment in those days with that chamber was to take some of those pieces and mount them in a special box. We called it a blue box for the obvious reason, but it was about three feet wide, three feet wide and stood about five feet off the floor.

It looked in some ways similar to a rack-mount stero system where you had these components and they slid into a rack. So, we had this big box on wheels, and we could actually use it in the chamber and we tried taking it out into some real world environments to measure ETS.

Q. Three by three by five, so close to Hugh Whiting's size?

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A. Roughly.
Q. How well did it work?
A. No offense, but it didn't work very well. It measured ETS fine, and we proved that in the laboratory. The problem was, because of what it looked like, it changed people's behavior. So, what we found -- in fact, we did this, one of the first experiments I remember with it, we actually took it to one of our group's Christmas parties at the end of 1985 and had this thing in the corner and it drew quite a lot of attention.

I saw one person who I had never seen smoking a cigarette actually pick up a cigarette and go blow smoke at it. We had people that I knew were smokers would actually leave the room to smoke.

So, that was our first indication that we had to be very careful because if we want the scientifically correct answer, we have got to be sure that we don't change the way people behave around the sampling equipment. That one, as I said, it measured fine but it changed people's behavior, so that wasn't acceptable.

Q. So, what did you do to fix that problem?
A. The next step was really to develop a smaller system, and this actually drew on some

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experience we had back into the late seventies of trying to put real miniature components into a briefcase.

So, the next development effort, really, was to take the knowledge that we had gained from all of these experiments and try to put equipment into really literally an attache case that, when you then close it, you wouldn't see any lights flashing or you wouldn't hear any noises.

And we developed that, called it a PASS, P-A-S-S, stands for portable air sampling system, and that for the time, for that time in history, worked quite well.

Q. Did you actually use the PASS sampling system in making real world ETS measurements?

A. We did. We developed it in the laboratory. We validated it in the laboratory. That also was patented by RJR. It was sold commercially for a number of years. We studied ETS in a large number of environments.

Q. What was the first real study that you did with the PASS sampler after you validated it?

A. The first large study we did was a study of ETS levels in aircraft cabins. It was done in 1986.

Q. Would you describe in somewhat more detail

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but briefly that study and what the results of it were?

A. The objective of that study was to determine whether or not separating smokers and non-smokers was effective in reducing the ETS levels that might be in the nonsmoking section of the aircraft.

So, based on that study design, the way that the experiment was conducted is that we took PASS briefcases onto aircraft cabin. We worked with Piedmont airlines at that time. They no longer exist. They have been bought out by U.S. Air.

But we actually had scientists who carried these PASS briefcases in the smoking section and they would either put the briefcase in the seat next to them or if somebody was sitting there they would put it on the little tray right in front of them.

So, we had samplers in the smoking section and we also had the briefcases in what's called the boundary rows, that is the first row of the nonsmoking section that was right adjacent to the smoking section.

Q. And what did you find as a result of the study?

A. Well, as I said, the objective was to see if there was -- was there a difference, was there a

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reduction in ETS, and the answer was yes, there was a significant reduction in what we were able to measure with the PASS briefcase, nicotine and particles. There was a significant reduction as you moved out of the smoking section.

Q. And did you publish the results of this study?

A. Yes, we did.

Q. What other studies were done with the PASS briefcase sampler?

A. Several other studies. We really, other than aircraft, we primarily focused on making measurements in offices, restaurants and we made those measurements in a number of cities in the U.S. and Canada.

Q. Who participated in those studies?

A. A number of different scientists. Certainly scientists from R.J. Reynolds, scientists from Lorillard Tobacco, Philip Morris and also an independent analytical consulting firm in Knoxville, Tennessee, International Technologies.

Q. And were the results of these published as well?

A. Yes.

Q. What did you learn from these additional

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studies with the PASS briefcase sampler?

A. Well, we learned a couple things. I think the first and foremost thing we learned is that when there's smoking going on with this sophisticated device, we can measure levels of nicotine and particles.

We also learned that when smoking wasn't going on, we could measure levels of particles.

Generally we also found that the ETS concentrations were very low and were, in fact, lower than many people had assumed or had reported previously.

Q. Now, Doctor, are PASS samplers still used today?

A. I'm not -- well, there's some people that are using them, but generally, no.

Q. And the PASS sampler, is it an area monitor?

A. It would be, yes.

Q. Now, have you also used personal monitors in exposure studies?

A. Yes, we have.

Q. Would you describe for the jury, please, the first time that you used personal monitors -- first, tell us what the difference is between a personal monitor and an area monitor and then describe the

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first study in which you used the personal monitor.

A. Okay. An area monitor would be basically -- the objective of the experiment would be to measure the concentration in an area. An area could be this room, for example.

So, if I brought in some sampling equipment and set it, say, in the middle of this room, then it would be measuring this area. That's an area monitor.

We found, and also along with the rest of the scientific community, came to the conclusion that we really want to know what personal exposures are, because what we found out, particularly with some of our office studies, is that people don't sit in their office all day. So, if we have this PASS briefcase in their office and they go out to lunch or they go to a seminar or go down to the copy room or whatever, they're breathing air that this area monitor is not breathing.

So, we thought it would be preferable, and science generally supports that notion, that it's preferable to actually take equipment and hang it on the person's body so that, basically, it follows them around wherever they go. That would be a personal monitor or personal sample.

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Q. And you used a personal monitor in a study in connection with what?

A. The first personal monitoring exposure study we did was in 1991 in Columbus, Ohio.

Q. Describe that for the jury and tell us what you learned from it.

A. We went to Columbus, Ohio and actually selected randomly about one hundred women who some of which were married to smokers, some of which were married to non-smokers, some of which worked outside the home, some of which did not work outside the home, and we put the personal monitors on them and actually had them wear them for five days. So, we measured their personal exposure for virtually a week.

We also put monitors inside their homes. We put generally there -- there were two in everyone's homes in what we called a high-use area where you'd put it like in the living room and then in what we call the low-use area, which would be a back bedroom typically.

But also one of the unique things about that study -- there were several unique things, but one of them is we also put personal monitors on the smoking husbands, that is the women whose husbands

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also smoked, we measured their ETS exposure as well.

The objectives of that study, there were several. I'll try to be brief. One of the objectives we talked about earlier was measuring smokers' exposure to their own ETS and we found it was about 16 times more exposure for smokers than it is for nonsmokers.

But we also were able to compare the effect of living with smokers versus working with smokers, and that study showed that, in general, there's about a ten-fold reduction in ETS exposure for people who worked with smokers compared with people who lived with smokers. So, it was a lower exposure for working with smokers.

Q. Let me just move back on one point, if I may, Doctor. You said you were comparing the ETS exposure of a smoker to the ETS exposure of a nonsmoker. Tell me again what you found.

A. We found that smokers were exposed on average to 16 times more ETS than nonsmokers.

Q. Now, have you conducted personal monitoring studies since you did the Ohio study?

A. Yes.

Q. And would you describe that activity for me, please?

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A. We did a study in 1992 that was in the suburban Philadelphia area and we -- at that point we had learned from the previous study, so science is taking another step forward. And we wanted to measure more things in indoor air, more ETS markers and more markers of general indoor air quality.

So, we actually did a study in which we had -- we developed monitoring equipment that could measure particles and also the VOCs, these volatile organic chemicals. And it was in many ways a similar type of study design. We recruited about one hundred subjects at random, some of which lived with smokers and some of which worked with smokers and, again, made that comparison of living with smoker versus working with smoker.

Q. And what did that show you?

A. Very similar result in many ways; that, in general, living with smokers resulted in a higher ETS exposure than working with smokers. Or to turn it another way around, that the most important factor in determining ETS exposure was whether or not you lived with a smoker.

Q. Now, Dr. Ogden, have you brought with you an example of a personal monitor?

A. I have, yes.

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Q. And would that assist you in describing that concept for the jury?

A. Yes.

Q. Would you just, if it's in your box there, just pull it out and if you can show it to the jury and describe how it works or if you need to step down with the court's permission.

A. It might be easier for me to stand up and use it. This is actually a sampler that we developed after the study that I just described to you. We did that study using equipment -- we developed some of it, we bought some of it from people that make this type of equipment. But again, we learned things from that exposure study, and we said, well, we immediately see ways of doing this better.

So, we wanted to develop a single system that could measure gas components or gas phase of ETS and the particles of ETS in one system. And prior to that time, that type of system did not exist. So, we developed this particular system and basically what we have done is we have taken a lot of different components and put them inside a box, and I'll show it to you here.

Q. Just show the court first.

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A. It looks rather homemade because it is homemade. This is really the guts of the sampling pump. Many of you have seen some components over here. There's a timer here. There's batteries under here. But the big advantage of this system is now with a single pump we were able to develop this thing that we called a sampler head that actually you can see inside here -- and that's one of the reasons for showing you those things earlier -- that XAD tube for nicotine is inside this housing, and that clear plastic holder with the filter inside is actually inside this aluminum body here. And the air for the nicotine sample enters here. The air for the particles enters straight in here.

So, we developed this. We developed this system which we then used in additional studies.

Q. And earlier your testimony you indicated that you obtained a patent on a personal monitoring system. Is that the system that was patented?

A. This is, yes. After we developed it and used it, we were so excited about how well it worked, we thought we would patent that device and then, actually, it is now commercially viable. There was a company that was interested in licensing that patent from us. They now manufacture this. It

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1 looks a little better than that. It's a commercial
2 version instead of the homemade version, but it's
3 available for sale and any scientist could purchase
4 it and use it in a study.
5 Q. Doctor, we have been talking about methods
6 for and actual measurements of ETS and measurements
7 in terms of nanograms and picograms and cubic
8 meters. I'd like to switch gears a little bit, if I
9 can, and ask you whether or not you can express
10 concentrations of ETS in terms of cigarette
11 equivalents.
12 A. Yes, you can.
13 Q. Would you tell us what is meant by the term
14 cigarette equivalents?
15 A. Sure. Cigarette equivalents is a concept
16 that has been used for a lot of years in the
17 literature to try to describe ETS exposures in units
18 other than those technical terms that you have just
19 used, nanograms per cubic meter, micrograms per
20 cubic meter or whatever.
21 But in essence, what it does, it describes
22 the exposure to ETS for the nonsmoker in terms of
23 how many cigarettes a smoker would have to smoke to
24 get the same equivalent exposure.
25 Q. Okay. Would you describe for us the work

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that you have done, the research and work that you have done in connection with the use of the concept of cigarette equivalents to express ETS exposures?

A. Sure. The most recent work, in fact, the largest body of work in which we published early this year a complete literature review of how people had -- how other scientists had used the concept of cigarette equivalents.

We also made a number of additional laboratory measurements that would enable the use of the cigarette equivalent concept in a better way. That is to address some of the concerns that other scientists had raised about the use of cigarette equivalents. They had asked for more information. Our research and our paper was designed to give them that information, and that was published in January of this year.

Q. Based upon that work that you have done, who first developed the concept of using cigarette equivalents?

A. The first report in the scientific literature that we could find was in 1972.

Q. And by whom?

A. It was by a Dr. Hoegg at the University of Cincinnati.

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Q. And did Dr. Hoegg report cigarette equivalents in terms of nicotine?

A. No, he did not. He reported it in terms of particles and carbon monoxide, I believe.

Q. And based on your work, who first reported cigarette equivalents based on nicotine?

A. The first description of cigarette equivalents in terms of nicotine that we could find appeared in 1975 by authors Heinz and Furst at Harvard University.

Q. And based on your work, when did scientists affiliated with the U.S. tobacco industry first report the use of cigarette equivalents exposure based on nicotine?

A. 11 years later, 1986.

Q. Now, have you published ETS exposures in terms of cigarette equivalents?

A. Yes.

Q. And did you report those cigarette equivalents in terms of nicotine?

A. Yes.

Q. And have you published cigarette equivalents for other ETS constituents?

A. I have, yes.

Q. And which ones were those?

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A. I have reported cigarette equivalents for particles or RSP, UVPM -- these are markers of the particles -- UVPM, FPM, Solanesol and an additional marker that we haven't talked about earlier today, something called Scopoletin.

Q. How did you select those substances as a basis for showing cigarette equivalents for showing ETS exposures?

A. These are the commonly used markers of ETS. One of the first requirements for cigarette equivalent calculation is that you have measured a good marker of ETS and you have actually measured it in ETS, and these are a fairly large number of markers that we have used and others have used to study ETS.

Q. Now, can you tell the jury whether or not, if you use nicotine as a marker and you calculate cigarette equivalents, it would over-estimate or under-estimate the ETS exposure?

A. Based on the available data on these good markers of ETS, nicotine would generally over-estimate exposures in terms of cigarette equivalents.

Q. Dr. Ogden, the jury has heard testimony from Dr. Katherine Hammond and Dr. Michael Siegel in

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which they stated certain exposure estimates in terms of cigarette equivalents using -- see if I get this right -- nitrosodimethylamine, NDMA.

Have you ever reported cigarette equivalents using NDMA?

A. No, I haven't.

Q. Why not?

A. First and foremost, NDMA does not satisfy the criteria of a good marker for ETS. Second of all, NDMA is virtually everywhere. It is in indoor air and outdoor air whether smoking goes on or not. It's in the food we eat. So, it's not a good marker and it doesn't allow us to correctly or, in a scientifically correct way, interpret exposures to ETS.

Q. You said NDMA was in the food we eat. Did I ask you to prepare an exhibit to illustrate that for the jury?

A. Yes, you did.

Q. Would that help to illustrate the concept?

A. Yes.

Q. Just, if you will, if I could -- can all of you see that? If you would just explain for the jury what you have done here with this exhibit.

A. What I have done is go to the scientific

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literature and find typical levels of NDMA or this N-nitrosodimethylamine that have been reported in various consumer products.

So, these numbers or these units are listed in nanograms, so that would be nanograms per the amount that I have shown there.

So, a number that has been reported for cigarettes is 4.3 nanograms of NDMA in the mainstream smoke of one cigarette.

And going down the list, an average level would be 26 nanograms in an eight-ounce glass of milk. About the same in a beer. Bacon, one ounce, 37. And going through, the hamburger, the cheese, spinach and up to fish, which is one of the highest reported levels of NDMA, over 270 nanograms in an eight-ounce portion of baked fish.

Q. This would be NDMA, the same substance that is found in cigarette smoke?

A. Yes, chemically the same substance.

Q. Now, Dr. Ogden, do you have an expert opinion regarding the scientifically correct way to describe flight attendant ETS exposures in terms of cigarette equivalents?

A. Yes, I do.

Q. And what is that opinion?

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A. Well, first of all, you have to use markers of ETS that have actually been measured in the aircraft cabin, and so that would be the way to do that. You would start with the scientific data on what those marker levels are and then you can calculate cigarette equivalents based on that.

Q. Which markers would you use, Doctor?

A. Don't really have a choice. You have to use the markers that have been measured. Those are nicotine, particles or RSP, and there are a couple of measurements, couple of studies that measured this UVPM, which is an indication of the particles as well.

Q. And in your expert opinion, Doctor, what was the average flight attendant exposure to ETS in terms of cigarette equivalents?

A. The average exposure in terms of cigarette equivalents is two to three cigarettes per year.

Q. And how did you determine that cigarette equivalent number?

A. I used the data on the typical exposures that were derived by Dr. Roger Jenkins, and I used the typical mainstream delivery for those markers that we had measured and others have measured, but the actual numbers I used were the ones reported in

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that paper in 1997.
Q. The Market Study paper?
A. Actually, the Cigarette Equivalent Study.
Q. I'm sorry. The Cigarette Equivalent?
A. Right.
Q. Now, when you first began, when we talked about smoke exposures, you said that smokers are exposed to ETS and that that -- would that be a factor in calculating cigarette equivalents, Doctor?
A. It would be, but I have not used it in this particular calculation. But in the most correct way, it should be included in that calculation.
Q. How does the fact that you haven't used it in this calculation affect your estimate?
A. Well, if I had included the estimate of smokers' exposure to their own ETS, my answer would come down. That is, I would -- it would be reported a lower cigarette equivalents for the flight attendants. So, by not using it, I have actually given a slight over-estimate or a conservative estimate of flight attendant exposure in terms of cigarette equivalents.
Q. Dr. Ogden, have you ever testified in court before?
A. No, first time.

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MR. WHITING: Thank you very much.
THE COURT: You folks need a break at this time?
MR. ROSENBLATT: I do.
THE COURT: All right. Let's take a short break.
(The jury exited the courtroom.)
THE COURT: Folks, court is still in session.
MR. WHITING: Apologize, Your Honor.
THE COURT: During the break, you must not discuss your testimony with anybody including the lawyers. Just relax and do whatever it is you want to do, but don't talk about the case.
(A recess was taken.)
THE COURT: Okay. Everybody here?
All right. If everybody is here, we'll get the jury out.
THE BAILIFF: Bringing in the jury.
(The jury entered the courtroom.)
THE COURT: All right. Have a seat, folks. Let's proceed.

CROSS EXAMINATION

BY MR. ROSENBLATT:

Q. As I have understood your testimony, during

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the entire time that you have been employed by R.J. Reynolds Tobacco Company, your entire focus has been on secondhand smoke?

A. I have been involved in other projects as well, but the main focus of my work has been ETS, yes.

Q. Like 95 percent as a practical matter?

A. I haven't thought about a number, but probably less than that, but certainly 80 to 90 percent, yes.

Q. Okay. Now, counsel asked you if you ever testified in a courtroom before, and I believe you said no.

A. That's correct.

Q. But you have testified in a lot of other forums, such as you testified in front of OSHA.

A. That's the only one I can think of, yes.

Q. OSHA is what? What do those initials stand for?

A. Occupational Safety and Health Administration.

Q. Now, that was in January of '95 where you gave testimony before OSHA?

A. I believe -- January, yes. I think it was '95.

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Q. Now, and you and some of your fellow scientists at RJR testified for several days in January of '95?

A. Yes. That's correct.

Q. Now, is it fair to say in general that the thrust of all of the testimony that you gave and your fellow scientists at RJR gave before OSHA was to convince -- was to attempt to convince the federal government that there should not be any further cigarette bans in the workplace; they just weren't necessary because the exposure levels were so low?

MR. WHITING: Objection, Your Honor. Outside the scope.

THE COURT: Let's have a sidebar.

MR. ROSENBLATT: Two hours I didn't make an objection.

THE COURT: That comment is totally uncalled for, counsel.

(Counsel and the court reporter approached the bench, and the following discussion was held outside the hearing of the jury:)

THE COURT: Making a comment like that in front of the jury is impermissible. Just don't do it. I keep telling you not to -- I'm not going

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to put up with it anymore.

Okay. Now --

MR. WHITING: If I may, just so Your Honor will consider the entirety of what I was going to say, it's outside the scope of direct examination, it's irrelevant, and also invades our First Amendment right concerning government -- we're not precluded from being held liable for petitions activities. These events were four years after the filing of the lawsuit.

THE COURT: Okay.

MS. ROSENBLATT: He spoke about -- he spoke about and testified what he's doing now. He talked about a 1997 study. They're talking about four years after. This has to do with what he's doing as a scientist.

His role is absolutely -- it is absolutely germane and in response to what he testified on direct, that basically he's sitting there in his laboratory and he's conducting all of these tests in terms of what he does for R.J. Reynolds. Part of what he does -- he presented opinions there, and there will be impeachment from what he said there as well because he gave contrary, we feel, testimony. But certainly the fact that he testified and the

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nature of his testimony there is relevant to the issues.

THE COURT: Well, there has been no testimony elicited on direct of any motivation or any reason that he was doing what he was doing other than he was doing a scientific study. If you want to bring this issue out, you are going to have to bring it out through somebody else or in another matter, because I don't think it's part of this particular examination on direct.

It is outside the scope and the question you asked, I think, is inappropriate. Sustain the objection.

(The following proceedings were held within the hearing of the jury:)

BY MR. ROSENBLATT:

Q. As I have listened to your testimony for about two hours on direct examination, is it fair for me as a layman to conclude that your basic position is, as someone who has studied secondhand smoke for a number of years in your capacity working for R.J. Reynolds Tobacco Company, that you don't believe smoking bans are necessary anywhere, in this building, on airplanes, anywhere, because scientifically you have concluded that the exposure

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level is so low, it's not a problem to anybody?

MR. WHITING: Same objection, Your Honor.

THE COURT: I'll sustain the objection in the manner in which the question was asked. Rephrase. You know what we're talking about.

BY MR. ROSENBLATT:

Q. You don't believe that smoking should be banned anywhere, do you, based on your work in this field and studying secondhand smoke, is that correct?

MR. WHITING: Same objection, Your Honor.

THE COURT: Same ruling. Let's not get into it. Move on to a different matter. That's the third time.

MR. ROSENBLATT: Your Honor, I have got to be heard.

THE COURT: Come sidebar and we'll talk about it.

(Counsel and the court reporter approached the bench, and the following discussion was held outside the hearing of the jury:)

THE COURT: Let me see if I can explain to you. I don't think this witness was put on this

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stand for the purpose of discussing a ban or non ban or imposing a ban on smoking.

His testimony was purely scientific. His testimony related to experiments as to levels of certain chemicals and composites, and that's basically all he talked about. He didn't talk about banning. He didn't talk about his own personal views. He only talked about his scientific research and that's --

MR. ROSENBLATT: But what I'm trying to establish, Judge, in terms of cross examination, is his bias in terms of being an employee of R.J. Reynolds who obviously has an interest, all of the conclusions that he expressed would be --

THE COURT: But the way you are asking the question, that's why I told you to rephrase it.

MR. ROSENBLATT: I looked at Susan and she didn't know how to rephrase it either.

THE COURT: I can't help you. I can't try your case. It seems to me if you want to show a bias, you have got to show a bias in a different way. It's got to come from a different direction. You have to establish a certain predicate before you can show this bias.

MS. ROSENBLATT: Your Honor, isn't it

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appropriate in terms of the whole picture in terms of having effective cross examination that, basically, our position, which we're entitled, I believe, to ask him is that the whole purpose of his research is to try to present an argument for Reynolds so that there will not be bans? That is his purpose. That's why --

THE COURT: I don't know if it's his purpose or not.

MS. ROSENBLATT: But we're allowed to ask that, aren't we?

THE COURT: Yes, but you are asking him his personal opinion. You are not asking him what the company asked him to do.

MS. ROSENBLATT: Then ask him from the company.

THE COURT: If he was, in fact, given a policy directive or anything else, you are not asking any of those questions. You are just asking his personal opinion which has nothing to do with his testimony.

MS. ROSENBLATT: Then ask it through Reynolds' position.

(The following proceedings were held within the hearing of the jury:)

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BY MR. ROSENBLATT:

Q. It's accurate to say, isn't it, that the policy of your employer, the R.J. Reynolds Tobacco Company, is that they fight and oppose bans on cigarette smoking, and that has been their consistent policy for the 20 years that they have been studying environmental tobacco smoke; is that correct?

MR. WHITING: Same objection, Your Honor.

THE COURT: Overruled regarding in a general terms, if he knows.

THE WITNESS: If I understand your question, you have asked me is it my understanding that that is the company policy? Is that the question you have asked me?

MR. ROSENBLATT: Let the court reporter read it back, please.

(The question referred to was read by the reporter.)

THE WITNESS: No, I wouldn't say that's -- I would say that's not correct. As I have been involved with the company now for 12 years, the purpose and the objective is to simply bring the science to the forefront and tell, as one of your --

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as you alluded to OSHA earlier, to tell OSHA what the science has to say about the issue.

BY MR. ROSENBLATT:

Q. Give me one example, please, just one, of any time that R.J. Reynolds as a company or any scientist such as yourself working for R.J. Reynolds ever testified in any forum, yeah, we agree smoking should be banned there. Has there ever been such an instance? Or is not the fact that R.J. Reynolds Tobacco Company and you and all the other RJR scientists have always unanimously and uniformly opposed smoking bans. It may be based on the science, but you have always opposed smoking bans; isn't that correct?

MR. WHITING: Objection, Your Honor. Outside the scope. Counsel is testifying.

THE COURT: I'll sustain it. First of all, it's a compound question. I don't know how many questions are involved, but I'll sustain the objection.

BY MR. ROSENBLATT:

Q. Let me ask you about an article that I believe was published in May of 1988, the title of which was Sampling Gasses Compounds in Environmental Tobacco Smoke, which I believe you wrote along with

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a Professor Eatough.
Does that ring a bell to you? Let me show it to you.
A. Please.
Yes, that's correct.
Q. So, you and he were co-authors of this article?
A. That's correct.
Q. Now, let me read to you what you wrote on the second page, and I'm quoting you now, and then I'm going to ask you a couple questions about it.
MR. WHITING: What is the article we are on, please?
MR. ROSENBLATT: I have -- the article begins on 739.
Q. (By Mr. Rosenblatt) I am on Page 740, the bottom paragraph: Environmental tobacco smoke is a major contributor to indoor air pollution in environments where smokers are present.
That statement seems to be contrary to what you testified today.
A. I don't know that it is contrary. I mean, we certainly recognize that environmental tobacco smoke is a contributor to what could be called indoor air pollution. Whether it's major or not

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depends on the circumstances and depends upon what the measurements show.

Q. You go on to say in the article: The identification and quantification of environmental tobacco smoke exposure is important because of irritant and suspected health effects associated with involuntary exposure and the large population which is exposed. Correct? You made that statement?

A. I assume.

Q. Well, your lawyer has the article in front of him.

A. I assume if you have quoted it accurately, then, yes, that's from that article.

Q. Then you go on to say: Tracers of environmental tobacco smoke used in the past include respirable or total suspended particulate matter: CO, nitrogen, oxides, nicotine, 3-ethenylpyridine, Solanesol, N-nitrosamines, aromatic hydrocarbons, acrolein and frequency of smoking.

Sound familiar that you wrote that?

A. Well, I can't recall. I mean, I assume you are quoting it accurately. That sounds like a reasonable reflection of the literature, yes.

Q. Okay. Now, when you made the statement in

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the article that the identification and quantification of environmental tobacco smoke exposure is important because of irritant and suspected health effects associated with involuntary exposure, what suspected health effects were you talking about?

A. That's a reflection of a number of comments and scientific and political and public policy decisions that had been in the scientific press and also in the lay press up to that point in 1988.

So there is -- there was a scientific -- I guess you would call it state of awareness maybe, at that point, that there may be health effects and, you know, science should come in and study what those exposures might be.

Q. Well, actually, in your footnotes to this article you cited to two reports which went way beyond that it may cause health effects. You cited to two reports which concluded in 1986 that exposure to secondhand smoke causes lung cancer and other diseases in healthy nonsmokers; isn't that correct?

A. Well, can you tell me which---

Q. Yes, I will.

MR. WHITING: May I approach, Your Honor?

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THE COURT: Yes, sir. Is that a copy of the document?

MR. WHITING: Yes.

THE WITNESS: May I keep this?

MR. WHITING: Yes.

A. Can you tell me which citations, and then I'll find those.

Q. (By Mr. Rosenblatt) Yes. Okay. Page 745.

A. Okay.

Q. But let me go back, because that particular sentence you put numbers 15 and 16, which I assume refers the reader to the footnotes which are in the back of the article, correct? And then footnote 15 refers to Environmental Tobacco Smoke, Measuring Exposure and Assessing Health Effects, National Academy of Sciences, Washington, D.C., 1986.

A. Yes, I see that. Right.

Q. Okay. And then the second footnote, 16, The Health Consequences of Involuntary Smoking, United States Department of Health and Human Services, 1986.

A. That's reference 16.

Q. Reference 16. So is it fair to say that at the time you wrote the article and used those two references to the Surgeon General's Report of 1986

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and the report of the National Academy of Sciences of 1986, you were generally familiar with those publications?

A. Yes.

Q. Okay. And you knew at the time you wrote the article that both of those publications in 1986 concluded that environmental tobacco smoke causes -- causes -- lung cancer and other diseases in healthy nonsmokers?

A. I had read those articles, those that you just described, as anyone could.

Yes, I'm aware that those were their conclusions, and the purpose in writing a scientific article and including them is to be complete, and of course we did that.

Q. You don't agree with that, do you? You referenced them because you wanted to be complete, but you certainly don't agree with the Surgeon General and the National Academy of Sciences. You didn't agree at the time of this article in May of 1988 and you don't agree today, do you?

MR. WHITING: Objection, Your Honor.

THE COURT: What's the objection?

MR. WHITING: Well beyond the scope of direct examination.

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THE COURT: Overruled.

A. Judging health effects is not the field of, especially of an analytical chemist. My field and my work is involved in trying to understand exposures and how those exposures either support or do not support the types of conclusions that have been reached in these two references that you have cited.

Q. Okay. And as I've understood your testimony today, your testimony about exposures, the exposures that you have told this jury about today certainly would not support the conclusion that secondhand smoke would cause lung cancer and other diseases in healthy nonsmokers because, according to your testimony, the level of exposure is so low that it couldn't cause those diseases?

A. That's not what I said today. Again, the job of a chemist is not to decide what level may or may not cause health effects. The job is to determine what those levels are, and that's what I have done.

Q. Yeah, but I mean, don't you -- you are more than a mere technician who does measurements. When you do the measurements and you do the science and you study environmental tobacco smoke and you reach

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1 certain conclusions and you write articles about
2 them, you try to go beyond the simple data and read
3 some logical conclusions from those data, correct?
4 A. Certainly. Any field of science would try
5 to take their data to the logical conclusions and
6 not overstep those or understate those.
7 Q. And you spent part of your direct
8 examination today with Mr. Whiting in conveying to
9 the jury certain conclusions which, as I understand
10 from the trace levels exhibit, that -- I mean, one
11 packet of Sweet 'N Low, a person might use one or
12 two packets in a cup of coffee. You're talking
13 about a packet of Sweet 'N Low in 400 Olympic-size
14 pools.
15 Obviously the conclusion that you draw is
16 that the amount of exposure to secondhand smoke is
17 unbelievably small and trivial, correct?
18 A. The purpose of this exhibit is to explain,
19 in hopefully non-scientific terms, what one
20 microgram per cubic meter is. And the exhibit that
21 you pointed to does in fact do that. That is an
22 accurate reflection of what one microgram per cubic
23 meter is. And that is the unit of measure in which
24 we determine nicotine in environmental tobacco
25 smoke.

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So, that is a wholly accurate statement, yes.

Q. So the exposure that individuals have, smokers or nonsmokers, to nicotine would be the equivalent of one Sweet 'N Low in 400 Olympic-size pools?

A. That's not what I said. What I said was that equates to one microgram per cubic meter. Measures of nicotine, for example, may be higher. It may be five micrograms per cubic meter, which would be five packs of Sweet 'N Low in 400 pools or may be 0.1, which would be a tenth of that pack. But that was simply meant to explain what one microgram per cubic meter is.

Q. Is it fair to say that your employer has drawn conclusions as a result of your research on secondhand smoke as to whether secondhand smoke is potentially harmful to people or whether it's not?

A. Any person and corporation is entitled to draw their influence or their policy or position. To my knowledge, the position of R.J. Reynolds is based upon a position of science. And that's the role that I play is to provide to science.

Q. Well, wouldn't you agree that in terms of R.J. Reynolds' position on science, that when you

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look at the tobacco industry, R.J. Reynolds and Philip Morris being the two largest companies, and then if you look at all the MDs, all the medical doctors and all the scientists, not only in the United States and in the world, that a fair comparison is that this is the tobacco industry and this is worldwide science in terms of the attitude and conclusions reached about the potential dangers of secondhand smoke?

MR. WHITING: Objection, Your Honor. Well outside the scope. Speculative.

THE COURT: Yeah. I do think so. I do think so. Sustained.

Q. (By Mr. Rosenblatt) Well, let me just ask you this. You have been studying secondhand smoke for -- you personally -- for 13 years?

A. 12.

Q. 12 years. You testified R.J. Reynolds has done research on it for about 20 years, right?

A. That's right, uh-huh.

Q. And obviously you have reached some conclusions?

A. From an exposure measurement perspective, which is again what I am bringing here, is we have made conclusions about what those exposures are. To

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the extent that those in many cases do not support some types of documents or statements, then, yes, we have pointed that out to the scientific community and to the regulatory bodies as well.

Q. Well, let me ask you this hypothetical question. And you have dealt with hypothetical questions in the past, correct?

A. On occasion.

Q. Okay. Let's assume that smoking isn't banned anywhere and the federal government or the Surgeon General is trying to figure out, well, you know, from the standpoint of health, should it be banned or shouldn't it be banned?

Isn't it fair to say that all the research that you have done and the other scientists at R.J. Reynolds have done, with respect to secondhand smoke, would take the position that bans aren't necessary because the level of exposure is so low?

A. I make two distinctions for you, if I may. Ban is a regulatory and policy area. Measurement of concentrations or exposures is a scientific area.

There are a number of -- well, let me answer one of your questions earlier. I believe that we, as RJR and the domestic tobacco industry, have done the best scientific job of understanding what

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exposures truly are. To the extent that those do not support those types of policy and regulatory decisions, yes, we make that public.

Q. Okay. But everything you have told this jury today, the science would not support a regulatory or policy attempt to ban smoking anywhere; isn't that correct?

MR. WHITING: Objection, Your Honor. Outside the scope. Asked and answered.

THE COURT: Sustained, sustained.

Q. Well, you testified on direct examination that the reason Reynolds began studying secondhand smoke 20 years ago was because it was a concern of their customers?

A. That was -- that's certainly part of the answer, yes.

Q. So 20 years ago people that were smoking R.J. Reynolds cigarettes -- Camels, Winston, whatever -- were concerned, a smoker was concerned, if I smoke in the house, is my cigarette smoke going to create any potential danger to my wife, children, or loved ones. And that is why 20 years ago -- one of the reasons 20 years ago -- R.J. Reynolds started researching this?

A. I am not sure I would characterize it that

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way. I can't testify as to what an individual smoker may have thought 20 years ago. Certainly there was coverage of the environmental tobacco smoke issue in scientific publications and also in popular publications.

To the extent smokers were aware of that, they would express concerns, social acceptability concerns, whether it would be annoyance or potential health effects. So we as a company were certainly aware of those concerns and addressed environmental tobacco smoke scientifically.

Q. Isn't it a fact, Dr. Ogden, that with -- in the last 20 years, with respect to smokers of R.J. Reynolds products who have asked the company about the dangers or lack of dangers of secondhand smoke, that R.J. Reynolds for the last 20 years has had a consistent policy of reassuring their customers secondhand smoke is not a problem health-wise. It may be an irritant, may be an annoyance to some people, but it's certainly not a health problem to your loved ones. Hasn't that been the consistent policy of your employer?

A. I have not reviewed what the policy may have been. That doesn't sound quite like a fair characterization to me.

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Q. Well, tell me what would be fair.

A. Well, the company has taken steps to make people aware of what the science shows on ETS. They have taken steps to facilitate accommodation of smokers and nonsmokers in, for instance, what we would call the hospitality environment, restaurants, bars. They have developed programs to help bar owners and restaurant owners and managers of work places accommodate the needs that those individual managers thought would fit their particular work place.

So, R.J. Reynolds has worked very closely with individuals and corporations that have concerns. And whether those concerns simply are the extent of creating a nonsmoking section in a cafeteria or whatever they may be, we have supported with information, you know, what the science says about what would happen if you separate, what will happen if you do this.

Q. Exactly my point. And in your answer you said: We tell people what the science shows. And according to you, what the science shows is that secondhand smoke is not a health problem to nonsmokers.

A. I need to be scientifically accurate with

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you here. I don't think that is what the science shows. You are asking me to say that there is no possibility of a health effect. As a scientist, I can't do that.

I can tell you -- flip the coin over. What I can tell you is that there is not sufficient proof that there is a -- there is a risk factor of environmental tobacco smoke causing diseases.

Q. Let me get very basic with you.

A. Okay.

Q. Dr. Ogden, you have been with Reynolds 13 years. You have got a Ph.D. in chemistry. You know many of the employees at the R.J. Reynolds Company, correct?

A smoker of Camels calls up and says, "Hey, I want some information about secondhand smoke. And the question is -- and I have read a lot of stuff. Smoking is banned in my work place. Smoking is banned in a lot of places. My wife is not a smoker. I have got three kids, ages three, six and nine. I want to know if, by smoking, am I damaging them?"

Isn't it true that the answer that question is going to get is, "No, you are not damaging your loved ones by smoking, because our science shows that secondhand smoke is not a health problem." I

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mean, isn't that really the nitty-gritty of it?

MR. WHITING: Objection, Your Honor. Well outside the scope of direct examination. Calls for speculation.

THE COURT: Come over here.

(The attorneys and the court reporter approached the bench and the following proceedings were had outside the hearing of the jury:)

THE COURT: The problem with the situation is your hypothesis is somebody's going to call up RJR and ask somebody. Who are they going to ask? The chemist? Are they going to ask the vice-president, the PR people? Who are they going to ask? The question is who is qualified to answer the question?

Now, if we are presupposing they are going to call the chemist and ask the chemist based upon his finding as a chemist, I guess he can answer the question. But as a policy maker or executive or anything else, unless he happens to be one, I don't see how he can answer the question. So how are you asking this question?

MR. ROSENBLATT: Really, Judge, in both senses, as a chemist -- and I am happy to ask him, okay, "Let's say this call was directed to you.

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What would your answer be as a chemist?"

THE COURT: If he can answer that question---

MR. ROSENBLATT: I think also by virtue of having worked for them 13 years, he's generally aware of what the policy is.

THE COURT: I don't think he can speak for the company on a policy.

MS. ROSENBLATT: Well, he's spoken about all the accommodation and how they work with various restaurants. And there have been many advertisements by R.J. Reynolds with 800 numbers where they provide that information as a company.

THE COURT: Fine. He can testify it's available on the 800 numbers, there's going to be a recording on the 800 numbers to tell him the answer or is the question going to be shifted to somebody who is going to give him an answer? And if that's the case, is he the one? If he is, what would his answer be? That's all.

MS. ROSENBLATT: So, from his own perspective.

(The following proceedings were had within the hearing of the jury:)

Q. (By Mr. Rosenblatt) Let me change that

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question around a little. The smoker calls up and has that question, "Is my smoking going to endanger the health of my nonsmoking wife and my three little kids?" And some big shot at R.J. Reynolds decides they want this call to go to you.

A. It's never happened.

Q. I understand that. It's a hypothetical question.

A. Oh, okay.

Q. That's why it's hypothetical. Let's assume -- I want you to -- you're the chemist. You have studied environmental tobacco smoke for 13 years. This guy has got a question about environmental tobacco smoke. I want you to answer it. I am the smoker. I asked you that question. What's your answer?

A. Well, I can't accept your hypothetical because, A, that's never happened and, B, that's not the way it would work. You are asking for a policy judgment.

Q. No, I'm not. I'm asking you what you would say to that smoker and I believe I'm entitled to ask a hypothetical question.

A. No. You were asking me what would R.J. Reynolds say.

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Q. No, I'm not.
A. Oh. Well, I don't understand your question.
Q. I am asking what Michael Ogden would say as a -- individually, personally, and as a 13-year employee of R.J. Reynolds. The call is directed to you as an expert in environmental tobacco smoke.
"I am a smoker of Camels. I enjoy smoking Camels, I like Camels, and I want to know, does my smoking endanger my nonsmoking wife and my three little kids? Nice to meet you, Dr. Ogden. I hear you are the chemist. You have got a Ph.D. Please answer my question."
MR. WHITING: Objection, Your Honor. Outside the scope. He's testified that there is no basis in fact for this hypothetical. It's unfair to the witness and unfair, period, as a question.
THE COURT: Overruled.
You may answer the question.
A. Well, first of all, it's 12 years and not 13 years. But in that situation --
Q. Sorry.
A. That's all right -- what I would have to say is that as a chemist that's not a question I can answer. I can tell you a number of things about the chemistry of environmental tobacco smoke and I can

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tell you a number of things about -- maybe about your particular situation. If you tell me how big the rooms are and how much you smoke and things like this, I might be able to guess as to how much ETS might be in the air.

If you really want to know, what I would tell that person as a chemist is, yes, we could come in and measure how much ETS might be in the air, and I could give you that number. To extrapolate it beyond that is something I cannot do.

Q. And I say to you as the smoker, "I'm not interested in your machines. I'm not interested in exposures. I'm interested in an answer to my question. Is my smoking, in your opinion, in someone that's been studying environmental tobacco smoke for 13 years, am I posing a health danger?" And you are telling me, as I understand it, you basically refuse to answer the question.

MR. WHITING: Objection, Your Honor.

MR. MOSS: Your Honor.

THE COURT: Sustain the question. He answered the question as best as I understand he can in his capacity as a chemist at this point. So I think we better move on.

Q. Okay. So what would you tell the customer?

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"That's your answer? The answer doesn't satisfy me. Is there someone else I could talk to at Reynolds where I would get a direct answer to this question? Dr. Ogden, who should I talk to? I don't like your answer."

A. Well, I would tell you it depends on, again, the area that you want to talk about. If you want to talk about toxicology, I would refer you to a person knowledgeable about the toxicology of tobacco smoke and what's known and what's not.

Q. "Dr. Ogden, I just want to know, from someone at R.J. Reynolds, is my smoke a health danger to my wife and little kids? I don't want to know about toxicology or anything else. I want an answer to that question. Who should I talk to at R.J. Reynolds?"

MR. WHITING: Objection, Your Honor. I think we are now running into being argumentative.

THE COURT: I think we are, too. Let's move on to a different subject matter.

Q. The exhibit on trace levels, who made that exhibit?

A. Well, it was made by a trial graphics company.

Q. When was that done?

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A. This week.
Q. And did you have input? I mean---
A. Yes.
Q. You did the---
A. Well, I didn't do the artwork. I did the scientific calculations and put that analogy basically on rough paper, but graphics artists actually made the exhibit.
Q. Okay.
A. Well, I should say a rough draft of that was made earlier than this, but the actual one you see today was made this week.
Q. Now, Dr. Ogden, in 18 -- in 1989 you published a study relating to levels of nicotine on airplanes. Isn't it true that you found a mean level of nicotine of 25.0 micrograms per cubic meter on airplanes with 17 smoking seats; you found a level, a mean level of 6.8 in nonsmoking seats?
MR. WHITING: Excuse me, Counsel. Could we have a reference to what you are referring to?
Q. Well, do you know what I'm referring to?
A. Not right off. I don't have recollection of numbers back that far, so it would help, be helpful if you could supply me with a copy.

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Q. You are familiar with a book that was funded by the Center For Indoor Air Research called the Chemistry of Environmental Tobacco Smoke, Composition and Measurement -- a couple of the authors were Dr. Jenkins and Dr. Guerin -- where they mention your name and some of your studies. I assume you have read this before.

A. Yes, I have read the book.

Q. You are familiar with it?

A. Sure.

Q. Let me show you the particular table that I'm talking about. For record purposes, Appendix 2, Field Studies, Nicotine Concentration.

MR. WHITING: May I see it, please? Could we have the other half of the table?

MR. ROSENBLATT: This is what I have got on that.

MS. ROSENBLATT: The other part is there.

MR. WHITING: It doesn't appear to be here. I think there's probably something on the top that gives references.

Do the best you can, Doctor.

Q. (By Mr. Rosenblatt) It's what's yellow that refers to you specifically.

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A. Okay. I see what's highlighted.
Q. Okay. So let's see if I am understanding this correctly. Airplanes, 17 smoking seats, the mean level of nicotine is 25.0.
A. That's what this table says, yes.
Q. And the reference is Ogden. You.
A. That's correct.
Q. Okay. And then airplanes, 14 nonsmoking seats. Again, the reference to you, 6.8?
A. Right.
Q. Is this table accurate?
A. I can't tell you without looking up the original citation.
Q. I mean, you don't have any reason to believe it's not accurate, do you?
A. Well, I don't know. If you want me to verify its accuracy, I would have to have a copy of the original paper.
Q. Well, let's -- for the purpose of my question, let's just assume -- let's give Jenkins and Guerin the benefit of the doubt and say it's accurate.
A. It's beyond that. There are typographical errors that happen all the time so, I mean, I am not doubting the accuracy of Dr. Jenkins and Guerin on

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it. I just simply can't verify what you asked me to do.

Q. Assume that Dr. Jenkins testified yesterday that it was in fact accurate. You wouldn't quarrel with that, would you?

A. Well, if he verified it as you asked the question and looked it up in the original paper, then, no, I will take his word for it, sure.

Q. If we assume that these levels, these mean levels, 25.0, 6.8, are accurate, you would agree that these are extremely high levels, aren't they?

A. No. I wouldn't characterize those as extremely high.

Q. Would you characterize them as high?

A. High, of course, is a relative term. I have seen higher, I have seen lower. They are certainly within the range of what one would expect.

Q. Well, isn't it a fact that the mean levels that you found and reported on airplanes exceed the mean levels that have been reported for both homes and typical office environments?

A. Let me step back a minute and---

Q. Well, just answer that and then---

A. These numbers here are generally higher than mean values that would be reported in either of

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those situations, yes.

These are concentration values. These are not exposure values. But may I explain that?

Q. Sure, sure.

A. What is not captured in this table is that this particular paper, this particular citation and this scientific study was not intended to study smoking levels on airplanes. It was an attempt, or the purpose of the paper was to evaluate a new monitor or a new sampling system that we had developed.

So it was in no way intended to be representative. In fact, all we did, we had some of these devices and we said, hey, next guy going on an airplane, will you carry this with you? And that's what it is.

So it was -- it was a scientific study looking at evaluating the performance of this sampler. It was not a scientific study intended to represent what ETS concentrations might be on aircrafts, on airplanes.

Q. This is the only study you have ever been directly connected with that dealt with airplanes specifically, correct?

A. You mean me or R.J. Reynolds?

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Q. You.
A. This is the only study that my name appears on, yes, that made any measurements in airplanes, that's true.
Q. Where is it? Do you have the study with you? I know you brought a box of stuff.
A. I can look. I don't think I did.
Q. Why don't you look?
A. Okay. No. I don't have that with me.
Q. Doctor Ogden, you are not a smoker, are you?
A. No, I'm not.
Q. Now, when you gave testimony before OSHA in January of 1995 with your fellow scientists from R.J. Reynolds, you were asked to reach and you in fact did reach certain policy conclusions based on your scientific examination of secondhand smoke; isn't that correct?
A. Let me try to tell you what, as I remember it, at least my part of that testimony was.
What I did was I took the proposed rule that OSHA had published in the Federal Register and I read that with a key to understanding two things. One of them was ETS exposure. And there were a number of flaws in the way OSHA had dealt with ETS exposure. In fact, they even defined exposure wrong

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in the proposed rule.

The purpose of my testimony was to point out the scientific inaccuracies in what OSHA had proposed from an exposure point of view.

Q. Is it fair to say that the subject under consideration at the OSHA hearing, from the standpoint of the federal government, was they were trying to decide whether smoking should be banned in certain work environments, correct? That was the overall general context of the OSHA hearing where you testified?

MR. WHITING: Objection, Your Honor. Outside the scope of direct.

THE COURT: Overruled.

A. Okay. Could I ask for the question again?

THE COURT: Yes, sir. Go ahead.

(The question referred to was read by the reporter as above-recorded.)

A. My understanding of OSHA's charge there was to determine by scientific evidence if there was a significant risk to health from smoking in work places under the jurisdiction of OSHA.

Q. Right. And your answer was there wasn't, there wasn't a significant health risk.

A. No. Well, what OSHA did is they drew some

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conclusions from some exposure studies that they had, that they had gathered together. My job and what I did was to come in and say, hey, guys, you did this wrong. You didn't look at the right studies. You didn't look at the best available evidence. And if you have got a wrong data set upon which you based a conclusion, you obviously haven't reached the right conclusion. So---

Q. Fine.

A. Okay.

Q. The conclusion they reached was that it was a health risk. You said, "Hey, guys, you've got that all wrong. Here's legitimate, accurate science which proves it's not a health risk."

MR. WHITING: Objection, Your Honor. Counsel is now testifying. Asked and answered. Outside the scope.

THE COURT: No. I think in the context of the subject matter we are talking about -- overruled.

You're talking about at that time?

MR. ROSENBLATT: Yes, Judge.

THE COURT: That's contained within that report or -- you are holding a report in your hand.

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MR. ROSENBLATT: No. Now I'm not.

THE COURT: Okay. Go ahead.

A. No, I wouldn't characterize it the way you said. You have characterized my job was to go in and attack the conclusion. That's not what I did. What I did was to scientifically evaluate the evidence that OSHA put forward as to what ETS exposures were, and what I did was to go in and look fully at the scientific literature and say, "Hey, you missed it here. This is wrong."

Now, to the extent that you can't draw a conclusion based on faulty data, then you might infer that I attacked the conclusion. But that was not my intent there. That was not my purpose. I didn't attack the conclusion. I simply evaluated the data and said, "You've got the wrong data here."

Q. And you not only said that, but you said that they basically misinterpreted the data?

A. They did in many cases, yes.

Q. And reached the wrong conclusion?

A. Well, I think that's fairly obvious. If you use the wrong data, you can't trust the conclusion.

Q. Okay. And what was their conclusion?

A. Well---

MR. WHITING: Objection, Your Honor.

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We are now well outside the scope.

THE COURT: Yes.

MR. ROSENBLATT: Well, it's just a question, Judge, of finally getting to the end point.

THE COURT: I think -- not through this witness. I think another witness might be more along those lines. I think he's testified as far as he can go, because I think what he's saying at this point is that it's up to them to make conclusions, and if that's the conclusion they made, so be it. But he can only tell you what he did as far as his employment was concerned.

Q. Is it fair to say when you said, "Hey, guys, you're looking at the wrong data," you said that to OSHA, what you were telling them with respect to the data they were looking at was their data showed much higher exposures to ETS than your correct data showed?

A. Well, it's even more complicated than that. What they have to base -- what they have to base their conclusion on is exposure. And what actually -- what OSHA did was to base some of their conclusions on concentrations.

Now, I don't know whether the jury has heard

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the distinction or not, but there's a very big one. And the first and foremost thing I did was to say, "Hey, you missed it." Exposure is not the same as concentration. They are technically different, and you can't make a conclusion based on exposure by looking at concentration. That's scientifically indefensible. You can't do that.

Q. You said that your purpose was you were addressing a specific proposed rule of OSHA. My question to you was, what was that proposed rule that you were addressing?

MR. WHITING: Objection, Your Honor. Well outside the scope.

THE COURT: The witness says he was -- I'm not sure I follow you on that. Let's come over and talk about this.

(The attorneys and the court reporter approached the bench and the following proceedings were had outside the hearing of the jury:)

THE COURT: What are you talking about?

MR. ROSENBLATT: He said, Judge, in his answer now that he was before OSHA addressing the proposed rule. In other words, I guess OSHA was considering a rule whether they would---

THE COURT: On the banning.

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MR. ROSENBLATT: Yes, whatever. I'm not sure. But that's what he was addressing, okay, what is the---

THE COURT: Based upon his scientific testimony and knowledge.

MR. ROSENBLATT: Right.

THE COURT: So what's the question again?

MR. ROSENBLATT: What was the proposed rule that you were addressing? Because all he did was say "I was addressing the proposed rule." Okay. What rule?

MR. WHITING: First of all, Your Honor, I think what the witness testified to was he was there to address the data on which OSHA relied and that he told them the data was incorrect because it was concentration data, not real exposure data.

Beyond that, this is an OSHA-proposed rule that occurs well after this case. It has no relevance. And I never asked him a thing --

THE COURT: I know.

MR. WHITING: -- about OSHA. It's outside the scope.

THE COURT: I think we are really getting too far beyond. There are other witnesses

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you can get this information through. He's not---

MR. ROSENBLATT: He's an employee, Judge, of a defendant --

THE COURT: That doesn't mean anything.

MR. ROSENBLATT: -- that has an interest. In terms of going, you know---

THE COURT: That's your conclusion. I will sustain the objection.

MR. ROSENBLATT: In terms of timing, I'm going to be at least another half hour.

THE COURT: We can break for lunch.

(The following proceedings were had within the hearing of the jury:)

THE COURT: Break at this time?

MR. ROSENBLATT: Yes. I think it would be appropriate at this time.

THE COURT: Let's take a lunch break now. It's 12:15. Get you back here at 1:30.

(The jury retired from the courtroom.)

THE COURT: We will be in recess.

(A lunch recess was taken.)

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